No. 2024-1508

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

APPLE INC.,

Appellant,

v.

LBT IP I LLC,

Appellee.

Appeal from the United States Patent and Trademark Office,
Patent Trial and Appeal Board, in No. IPR2020-01189

JOINT APPENDIX

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Paper 48
Entered: December 15, 2023

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

LBT IP I LLC,
Patent Owner.

IPR2020-01189
Patent 8,497,774 B2

Before JOHN A. HUDALLA, SHEILA F. McSHANE, and JULIET MITCHELL DIRBA, *Administrative Patent Judges*.

HUDALLA, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision on Remand
Determining No Remaining Challenged Claims Unpatentable
35 U.S.C. §§ 144, 318(a)

I. INTRODUCTION

This Remand Decision is a final written decision on remand from the United States Court of Appeals for the Federal Circuit, which vacated and remanded certain parts of our original Final Written Decision (Paper 39, "Final Dec.") in this *inter partes* review. *See LBT IP I LLC v. Apple Inc.*,

No. 2022-1613, 2023 WL 3914920 (Fed. Cir. June 9, 2023).[1] In particular, the Federal Circuit vacated and remanded our obviousness determinations with respect to claims 8, 10, 13, and 15 of U.S. Patent No. 8,497,774 B2 (Ex. 1001, "the '774 patent"). Paper 42, 13.

We have jurisdiction under 35 U.S.C. § 6, and we issue this Final Written Decision on Remand under 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons discussed below, Apple Inc. ("Petitioner") has not demonstrated by a preponderance of the evidence that remaining challenged claims 8, 10, 13, and 15 of the '774 patent are unpatentable.

A. Background

Petitioner filed a Petition (Paper 1, "Pet.") requesting an *inter partes* review of claims 1, 4–6, 8, 10, 13, and 15 ("the challenged claims") of the '774 patent. LBT IP I LLC ("Patent Owner") filed a Preliminary Response. Paper 8. Taking into account the arguments presented in Patent Owner's Preliminary Response, we determined that the information presented in the Petition established that there was a reasonable likelihood that Petitioner would prevail with respect to its unpatentability challenges. Pursuant to 35 U.S.C. § 314, we instituted this proceeding on March 4, 2021, as to all challenged claims and all asserted grounds of unpatentability, which are reproduced below (Paper 9 ("Dec. on Inst.")):

[1] A copy of the Federal Circuit's decision has been entered as Paper 42, to which we will refer hereinafter.

Claims Challenged	35 U.S.C. §	References/Basis
1, 4–6, 8, 10, 13, 15	103(a)[2]	Sakamoto[3]
1, 4–6, 8, 10, 13, 15	103(a)	Sakamoto, AAPA[4]
1, 4–6, 8, 10, 13, 15	103(a)	Sakamoto, Hayasaka[5]

During the course of trial, Patent Owner filed a Patent Owner Response (Paper 17, "PO Resp."), and Petitioner filed a Reply to the Patent Owner Response (Paper 25, "Pet. Reply"). Patent Owner also filed a Sur-reply.[6] Paper 31 ("PO Sur-reply").

Petitioner filed Declarations of Scott Andrews with its Petition (Ex. 1003) and with its Reply (Ex. 1077). Both parties filed a transcript of the deposition of Mr. Andrews. Exs. 1068, 2003.

An oral hearing was held on December 8, 2021, and a transcript of the hearing is included in the record. Paper 38 ("Tr.").

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[2] The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102, 103, and 112. Because the application leading to the '774 patent was filed before March 16, 2013 (the effective date of the relevant amendments), the pre-AIA versions of §§ 102 and 103 apply.

[3] Japanese Unexamined Patent Application Publication No. JP 2004-37116A, published Feb. 5, 2004 (Ex. 1004, "Sakamoto"). Sakamoto is a Japanese-language publication (Ex. 1004, 36–49, 58) that was filed with an English-language translation (*id.* at 1–19, 21–34, 52–56) and declarations attesting to the accuracy of the translation (*id.* at 20, 50). Our citations to Sakamoto herein refer to the translation.

[4] Applicants' Admitted Prior Art (Ex. 1001, 11:22–30, "AAPA").

[5] U.S. Patent No. 5,845,142, filed Aug. 29, 1997, issued Dec. 1, 1998 (Ex. 1011, "Hayasaka").

[6] The parties also filed papers related to Patent Owner's motion to amend, but the motion to amend is not within the scope of the instant remand.

We issued a Final Written Decision determining, *inter alia*, that Petitioner demonstrated by a preponderance of the evidence that claims 1, 4–6, 8, 10, 13, and 15 of the '774 patent are unpatentable. Final Dec. 68. As part of our analysis for claims 8, 10, 13, and 15, we determined that the term "multitude" in the recited "multitude of threshold values" of claim 8 may include two threshold values. *Id.* at 12–18. We applied this interpretation as part of our determination that claims 8, 10, 13, and 15 would have been obvious over Sakamoto under 35 U.S.C. § 103(a). *Id.* at 37–44.

On June 9, 2023, the Federal Circuit issued an opinion vacating and remanding our obviousness determinations with respect to claims 8, 10, 13, and 15 of the '774 patent.[7] Paper 42, 13. The court's decision was based on its construction of "multitude of threshold values" in the following limitation of claim 8:

> wherein the battery power level monitor measures a power level of the charging unit and adjusts a power level applied to location tracking circuitry responsive to one or more signal levels, the power level comprising a *multitude of threshold values* determined by a user or system administrator to intermittently activate or deactivate the location tracking circuitry to conserve power of the charging unit in response to the estimated charge level of the charging unit.

Ex. 1001, 16:53–61 (emphasis added). The court stated that "[t]he plain and ordinary meaning of multitude in the '774 patent does not encompass two threshold values." Paper 42, 11. Further clarifying its construction, the court stated that "[w]e hold only that multitude does not include two but

[7] Patent Owner did not appeal our obviousness determinations regarding claims 1 and 4–6 or our denial of Patent Owner's motion to amend. *See* Paper 42, 9.

must include as few as five threshold values." *Id.* at 13. Thus, the court vacated our determination that Sakamoto's two battery power level thresholds teach the claimed "multitude of threshold values." *Id.*

The court also noted that we did not address Petitioner's alternative argument that Sakamoto teaches at least four threshold values—two battery level thresholds and two GPS signal level thresholds. Paper 42, 13. Accordingly, the court remanded this case to us to determine "whether multitude encompasses three or four threshold values and whether the two sets of threshold values disclosed in Sakamoto teach a multitude of threshold values." *Id.*

On remand, we asked the parties to brief whether—as a matter of claim construction—the "threshold values" in the recited "multitude of threshold values" of claim 8 are limited to battery power level threshold values or whether they may also include signal level threshold values. Paper 43, 3. Petitioner filed an opening brief (Paper 45, "Pet. Remand Br.") and a responsive brief (Paper 46, "Pet. Remand Resp."). In parallel, Patent Owner also filed an opening brief (Paper 44, "PO Remand Br.") and a responsive brief (Paper 47, "PO Remand Resp.").

B. The '774 patent

The '774 patent is directed to location and tracking communication systems. Ex. 1001, 1:33–34. Figure 1 of the '774 patent is reproduced below.

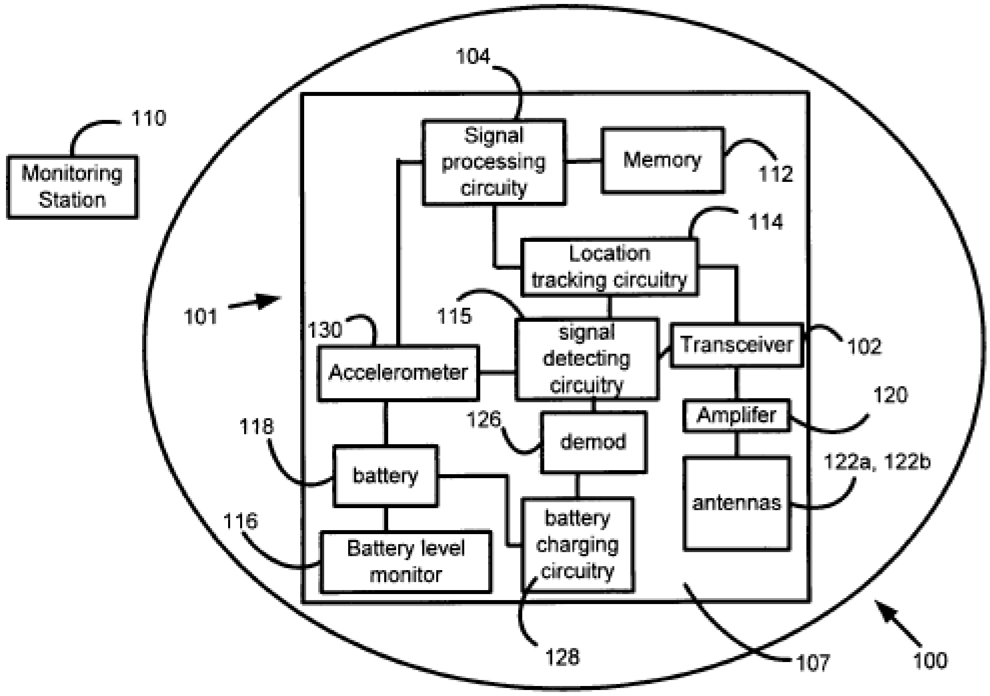

Figure 1

Figure 1 depicts a schematic of tracking device 100, which contains electronic components 101 such as transceiver 102, signal processing circuitry 104 (e.g., a microprocessor or other signal logic circuitry), and accelerometer 130. *Id.* at 4:62–64, 6:54–57. Location tracking circuitry 114 (e.g., global positioning system (GPS) circuitry) calculates location data received and sends the data to signal processing circuitry 104. *Id.* at 7:17–19. Signal detecting circuitry 115 detects and measures signal power level. *Id.* at 7:22–23. Battery level monitor 116 detects a battery level of battery 118. *Id.* at 7:25–28.

Tracking device 100 periodically checks availability of a GPS signal by performing a GPS signal acquisition to determine if a receive communication signal is above a first signal level. *Id.* at 8:7–10. Location tracking circuitry 114 or transceiver 102 may be placed in a sleep or standby mode to conserve a battery level of battery 118. *Id.* at 8:4–8. Electronic

tracking device 100 may resume GPS signal acquisition using GPS satellites when the acquired receive communication signal level is above the first signal level. *Id.* at 8:10–16.

Accelerometer 130 may also activate if a power level of the receive communication signal (e.g., GPS signal) is insufficient for processing. *Id.* at 10:47–49. In this case, processing unit 104 computes current location coordinates using acceleration measurements. *Id.* at 10:53–54. When the receive communication signal again becomes sufficient for processing, accelerometer 130 is deactivated and location tracking circuitry 114 is activated. *Id.* at 10:58–67. In this case, processing unit 104 resumes the calculation of location coordinates from the receive communication signal. *Id.*

Figure 4 of the '774 patent is reproduced below.

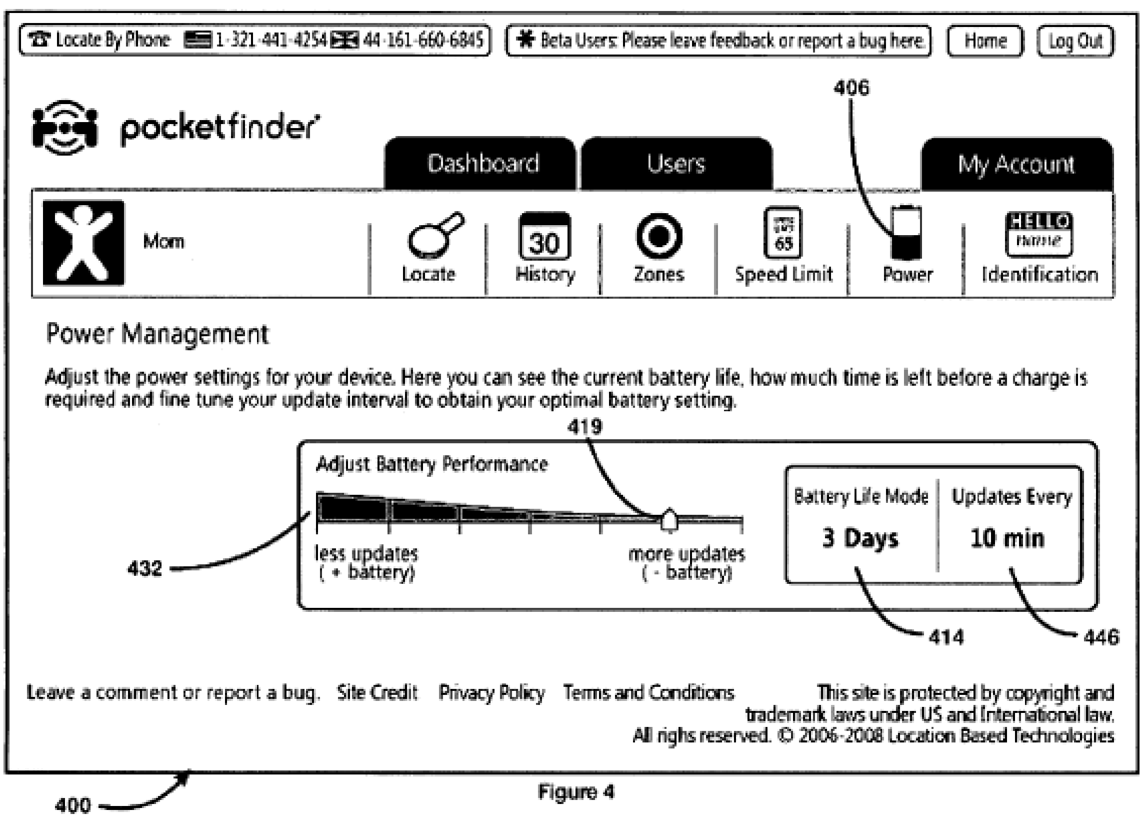

Figure 4

Figure 4, above, depicts screen display 400 of a personal communication device including a user definable adjustable power level monitor for an electronic tracking device. *Id.* at 5:5–7, 11:2–4, 11:12–17. Battery level monitor 116 measures in real-time battery charge level 406 of battery 118 and predicts estimated remaining battery charge life 414 in response to battery charge level 406. *Id.* at 11:22–25, 13:52–58. Battery level monitor 116 also adjusts the power level applied to location tracking circuitry 114 or transceiver 102 responsive to one or more signal levels. *Id.* at 13:52–58.

A local battery power adjustment mechanism generates in substantially real-time an updated set of network communication signaling protocols including, for example, update rate 446 (e.g., refresh rate) of location coordinate packets. *Id.* at 11:31–36. Update rate 446 consists of a request rate of location coordinate packets by the target host and/or a listen rate of location coordinate packets by the portable electronic tracking device. *Id.* at 11:36–41. The local battery power adjustment mechanism includes user-adjustable slider 432[8] to graphically display in substantially real-time the trade-off relationships between remaining battery charge level 414 and update rate 446 of location coordinate packets. *Id.* at 11:53–57. The user may select a multitude of threshold values via slider 432 to intermittently activate or deactivate location tracking circuitry 114 in order to conserve the power of battery 118. *Id.* at 13:58–67. For example, the user may adjust slider 432 to choose a range of values between a lower update rate 446 (and

[8] Slider 432 is also called "user adjustable screen icon 432," "on-line user adjustable cursor display 432," and "active display 432" in the Specification of the '774 patent. *See, e.g.*, Ex. 1001, 11:53–57, 13:13–18, 13:58–67.

less battery usage) and a higher update rate 446 (and more battery usage). *Id.* at 11:53–57, Fig. 4. This results in "an appropriate update[d] set of network communication signaling protocols to achieve a desired user defined battery operating environment, e.g., obtain optimal battery life, obtain optimal update rate, [and the] tradeoffs between them." *Id.* at 11:58–63. This further may result in the local battery power adjustment mechanism communicating a message to activate or deactivate a portion of the transceiver circuitry, processor circuitry, or location tracking circuitry. *Id.* at 11:44–53.

The '774 patent issued from Application No. 12/419,451 filed on April 7, 2009, which is a continuation-in-part of six applications. Ex. 1001, codes (21), (63).

C. Illustrative Claim

Of the remaining claims of the '774 patent, claim 8 is independent. Claims 10, 13, and 15 depend from claim 8. Claim 8 is illustrative of the remaining claims and recites:

> 8. A local charging management device to manage electrical resource capability for an electronic tracking device that is tracked by at least one other tracking device comprising:
>
> a battery power level monitor;
>
> a charging unit; and
>
> an electrical power resource management component to adjust cycle timing of at least one of a request rate of location coordinate packets to a target host and a listen rate of the location coordinate packets responsive to an estimated charge level of the charging unit,
>
> wherein the battery power level monitor measures a power level of the charging unit and adjusts a power level

> applied to location tracking circuitry responsive to one or more signal levels, the power level comprising a multitude of threshold values determined by a user or system administrator to intermittently activate or deactivate the location tracking circuitry to conserve power of the charging unit in response to the estimated charge level of the charging unit.

Ex. 1001, 16:43–61.

D. Remaining Challenged Claims and Grounds

We address below the remaining grounds at issue in this Remand Final Written Decision, which are summarized in the following table (Pet. 6; Dec. on Inst. 29; Paper 42, 17):

Claims Challenged	35 U.S.C. §	References/Basis
8, 10, 13, 15	103(a)	Sakamoto
8, 10, 13, 15	103(a)	Sakamoto, AAPA
8, 10, 13, 15	103(a)	Sakamoto, Hayasaka

II. ANALYSIS

A. Legal Standards

A claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, so-called secondary

considerations.[9] *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). We also recognize that prior art references must be "considered together with the knowledge of one of ordinary skill in the pertinent art." *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994) (citing *In re Samour*, 571 F.2d 559, 562 (CCPA 1978)).

B. Level of Ordinary Skill in the Art

For the same reasons discussed in our original Final Written Decision, we apply the following level of ordinary skill in the art: A person of ordinary skill in the art (or "POSITA") would have had a bachelor's degree in Electrical Engineering, Computer Engineering, Computer Science, or an equivalent degree, with two years of experience in GPS navigation, portable tracking devices, or related technologies. Final Dec. 10–11.

C. Claim Interpretation

In an *inter partes* review, we construe each claim

> using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. [§] 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.

37 C.F.R. § 42.100(b). Accordingly, our claim construction standard is the same as that of a district court. *See id.* Under the standard applied by district courts, claim terms are generally given their plain and ordinary meaning as would have been understood by a person of ordinary skill in the

[9] The trial record does not include any evidence of secondary considerations of nonobviousness.

art at the time of the invention and in the context of the entire patent disclosure. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc). "There are only two exceptions to this general rule: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution." *Thorner v. Sony Comput. Entm't Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012).

1. "Multitude"

As discussed above, the Federal Circuit held that "[t]he plain and ordinary meaning of multitude in the '774 patent does not encompass two threshold values." Paper 42, 11. The court also stated that "multitude does not include two but must include as few as five threshold values." *Id.* at 13. Thus, based on the court's holding, a "multitude" cannot be two threshold values. *Id.* at 11, 13. Although the court left open the question of whether a "multitude" encompasses three or four threshold values, we do not need to answer this question to dispose of the remaining claims and grounds. *See, e.g.*, *Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) ("The Board is required to construe 'only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.'" (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

2. "The power level comprising a multitude of threshold values"

In briefing on remand, the parties addressed the construction of "multitude of threshold values" in the following limitation from claim 8:

> wherein the battery power level monitor measures a power level of the charging unit and adjusts a power level applied to location tracking circuitry responsive to one or more signal levels, the power level comprising a *multitude of threshold values* determined by a user or system administrator to intermittently activate or deactivate the location tracking circuitry to conserve power of the charging unit in response to the estimated charge level of the charging unit.

Ex. 1001, 16:53–61 (emphasis added). In particular, the parties addressed whether—as a matter of claim construction—the "threshold values" in the recited "multitude of threshold values" are limited to battery power level threshold values or whether they may also include signal level threshold values. *See* Paper 43, 3.

Petitioner argues that "any construction of 'threshold values' must include *both* battery power *and* GPS signal level threshold values." Pet. Remand Br. 1. Petitioner notes that the '774 patent discloses an embodiment where a GPS signal level is related to a threshold value. *Id.* (quoting Ex. 1001, 7:55–59). Petitioner explains how the system of the '774 patent attempts to save battery power by deactivating the GPS when GPS signal levels reach a GPS signal level threshold, i.e., "they are too weak." *Id.* at 2 (citing Ex. 1001, 3:2–7, 7:55–8:3, 8:7–16, 8:67–9:3). Petitioner further explains that the GPS signal level threshold is used to determine whether to activate or deactivate accelerometer circuitry. *Id.* at 3–4 (citing Ex. 1001, 9:14–16, 10:38–52, Fig. 3). Petitioner contends that "this embodiment would be inoperable if it solely looked at a multitude of battery level thresholds" and "[a] construction of 'multitude of threshold values' that excludes GPS signal levels would read out this specific embodiment of the '774 Patent." *Id.* at 4–6. Finally, Petitioner notes that "threshold value" appears only two times in the '774 patent: once with reference to battery

power threshold levels, and another with reference to GPS signal level thresholds. *Id.* at 6–7 (citing Ex. 1001, 7:55–58, 13:58–62).

Patent Owner argues that "[t]he claim language itself . . . shows that the 'multitude of thresholds' refers to the power level that is monitored and adjusted by the battery power level monitor." PO Remand Br. 2. Patent Owner also argues that the specification of the '774 patent "repeatedly and consistently identifies the claimed power level with battery power level 406." *Id.* at 2–3 (citing Ex. 1001, 13:52–67). Patent Owner additionally argues that the specification "discloses that battery power level adjustments may be based on user input," and that "the recited 'multitude of threshold values' corresponds to value 419, which is explicitly disclosed as defining a battery power level threshold that can be adjusted to a multitude of values." *Id.* at 3–4 (citing Ex. 1001, 11:44–63, 13:58–67, Fig. 4). Patent Owner further highlights how the specification never "refers to a GPS signal level as a 'power level,' but only as a 'signal level.'" *Id.* at 4 (citing Ex. 1001, 2:64–65, 7:57–58, 8:10, 8:16, 13:58, 16:56).

In Petitioner's responsive brief, Petitioner argues that the parties' dispute is simply whether the GPS signal level embodiment is part of the claims or not. Pet. Remand Resp. 1. According to Petitioner, Patent Owner ignores the GPS signal level embodiment in Figure 3 of the '774 patent and instead focuses solely on the battery level embodiment of Figure 4. *See id.* at 1–3. Petitioner also argues that the transitional word "comprising" in "the power level comprising a multitude of threshold values" implies that the "'multitude of threshold values' may include the power level of a battery *but the claim is not limited to only those power levels*." *Id.* at 4–5 (citing *Crystal Semiconductor Corp. v. TriTech Microelectronics Intl'l, Inc.,* 246 F.3d 1336,

1362 (Fed. Cir. 2001)). As such, Petitioner contends that we should read the "broad, plain language used in claim 8" to cover both "the battery level embodiment columns 11-13, as relied upon by [Patent Owner], but also the precise GPS signal embodiment from column 7 through column 10." *Id.* at 5.

In Patent Owner's responsive brief, Patent Owner argues that Petitioner "ignores [the] clear claim language" and instead "relies on a single embodiment disclosed in the '774 Patent that is separate and distinct from the embodiment covered by Claim 8's 'multitude of threshold levels.'" PO Remand Resp. 1. According to Patent Owner, "[t]he '774 Patent discloses two distinct and complimentary embodiments that are each separately encompassed in Claim 8." *Id.* at 2. Patent Owner also disputes that the '774 patent discloses a multitude of GPS signal level thresholds because the specification only refers to a singular GPS signal level threshold value. *Id.* at 3 (citing Ex. 1001, 7:55–59). Patent Owner additionally notes that the GPS signal level embodiment of Figure 3 was originally associated with prosecution claim 16, while the magnitude of power levels embodiment of Figure 4 was originally associated with prosecution claim 17. *Id.* at 5; *see also* Ex. 2019, 372 (prosecution claims 16 and 17 as originally filed); PO Remand Br. 3 (discussion about prosecution claim 17).

To decide whether "the power level comprising a multitude of threshold values" includes GPS signal level thresholds, we start with the words of claim 8. Claim 8 recites a "battery power level monitor" that (1) "measures a power level of the charging unit" and (2) "adjusts a power level applied to location tracking circuitry responsive to one or more signal levels." Claim 8 further recites that "the power level compris[es] a

multitude of threshold values determined by a user or system administrator." The remainder of claim 8 states the purpose of the "multitude of threshold values," which is "to intermittently activate or deactivate the location tracking circuitry to conserve power of the charging unit in response to the estimated charge level of the charging unit." The natural reading of these recitations is that the "power level" associated with the "multitude of threshold values" is the battery power level that is (1) measured by the battery power level monitor and (2) adjusted by the battery power level monitor and applied to location tracking circuitry. We also note that the claim language already incorporates a limitation directed to "signal levels" insofar as the battery power level monitor "adjusts a power level applied to location tracking circuitry responsive to *one or more signal levels*" (emphasis added). As such, the limitation "one or more signal levels" is recited separately from the limitation "the power level comprising a multitude of threshold values." Given "[t]he general presumption that different terms have different meanings," *Chicago Bd. Options Exch., Inc. v. Int'l Sec. Exch., LLC*, 677 F.3d 1361, 1369 (Fed. Cir. 2012), we ascribe different meanings to the recited "signal levels" and "power level."

We next turn to the written description of the '774 patent. The only reference to a "multitude of threshold values" appears in the following paragraph:

> In yet another advantage, the present invention power charging monitor (e.g., battery level monitor 116) measures a power level (e.g., battery power level 406) of power charging unit (e.g., battery 118) and adjusts a power level (e.g., battery power level 406) applied to, for example, location tracking circuitry (e.g., location tracking circuitry 114) or transceiver 102 responsive to one or more signal levels. In contrast to previous manufacturer tracking device power level settings, the

> present invention has the capability of power level (e.g., battery power level 406) adjustments include *multitude of threshold values* (see active display 432 of FIG. 4) that is determined by user or system administrator to intermittently activate or deactivate location tracking circuitry (e.g., location tracking circuitry 114) to conserve power of the power charging unit (e.g., battery 118) responsive to estimated charge level (e.g., battery charge level 406).

Ex. 1001, 13:52–67 (emphasis added); *see* Paper 42, 11 (court pointing to Figure 4 and this passage as "[t]he only example of a multitude of threshold values provided in the specification"). Thus, the specification directly links the "multitude of threshold values" with battery power level 406. Ex. 1001, 13:52–67. It also links the "multitude of threshold values" with active display 432 in Figure 4, which is also called "slider 432," "user adjustable screen icon 432," "on-line user adjustable cursor display 432." *See id.* at 11:53–57, 13:13–18, 13:58–67. The specification states that "user adjustable electronic display 432 . . . indicates [the] current level of battery 406 and allows [the] user a capability to adjust power level thereof." Accordingly, a user may adjust screen cursor value 419 within active display 432 to choose the desired battery power threshold value among the multitude of battery power threshold values. *See id.* at 11:44–67, 13:58–67, 15:17–21, Fig. 4. Both parties acknowledge that this embodiment is within the scope of the recited "multitude of threshold values." Pet. Remand Br. 6–7; PO Remand Br. 3–4. We agree.

The written description uses the word "threshold value" in only one other passage: "In one embodiment, the accelerometer 130 activates upon one or more designated antenna(s), e.g., antennas 122 a, 122 b, detecting a first signal level, e.g., a low signal level or *threshold value*, as specified by, for instance, a user or system administrator." Ex. 1001, 7:55–59 (emphasis

added). Petitioner argues that this passage "describes an embodiment that includes GPS signal level as part of the multitude of threshold values." Pet. Remand Br. 1. Yet the mere use of the word "threshold" in this context does not tie embodiments pertaining to a signal level, such as the one described in Figure 3, to the recitation "the power level comprising a multitude of threshold levels." Furthermore, as stated above, claim 8 already includes a limitation directed to adjusting the applied power level to the location tracking circuitry "responsive to one or more signal levels," which is consistent with "the low signal level or threshold value" in this passage from the written description. *See* Ex. 1001, 16:53–61; *see also id.* at 13:52–58 ("[P]ower charging monitor (e.g., battery level monitor 116) measures a power level (e.g., battery power level 406) of power charging unit (e.g., battery 118) and adjusts a power level (e.g., battery power level 406) applied to, for example, location tracking circuitry (e.g., location tracking circuitry 114) or transceiver 102 *responsive to one or more signal levels*" (emphasis added)).

Petitioner also argues that the signal level embodiment of Figure 3 "would be inoperable if it solely looked at a multitude of battery level thresholds." Pet. Remand Br. 4–5. According to Petitioner, a construction limiting the "multitude of threshold values" to battery power thresholds would read out the Figure 3 embodiment. *Id.* at 5–6; *see also* Pet. Remand Resp. 1–7 ("The dispute is simply whether that embodiment is part of the claims or not."). We disagree. As stated above, claim 8 already recites that the battery power level monitor adjusts the battery power level "applied to location tracking circuitry *responsive to one or more signal levels*," which incorporates the notion of responding to a signal level threshold. *See*

Ex. 1001, 13:52–58, 16:53–61. Thus, we do not agree that Patent Owner's proposed construction of the "multitude of threshold values" reads out a signal level embodiment.[10] The existing "signal levels" recitation in claim 8 also undermines Petitioner's argument that Patent Owner's proposed construction would result in a system that "only looked at a multitude of battery threshold values" and could "never deactivate the GPS circuitry." Pet. Remand Br. 5.

We also have considered Petitioner's arguments that the word "comprising" in "the power level comprising a multitude of threshold values" "compels a conclusion that the 'threshold values' in claim 8 are not limited to only battery levels." Pet. Remand Resp. 4–5 (citing *Crystal Semiconductor Corp. v. TriTech Microelectronics Int'l, Inc.,* 246 F.3d 1336, 1362 (Fed. Cir. 2001); *Genentech, Inc. v. Chiron Corp.,* 112 F.3d 495, 501 (Fed. Cir. 1997)). We do not agree with the premise of Petitioner's arguments because this limitation defines what "the power level" comprises, not what "a multitude of threshold values" comprises. Thus, contrary to Petitioner's arguments, whatever follows the term "comprising" in this limitation must still be a "power level" to be within the scope of the claim. As such, "the power level comprising a multitude of threshold values" refers

[10] We further note that where, as here, "the patent describes multiple embodiments, every claim does not need to cover every embodiment." *Pacing Techs., LLC v. Garmin Int'l, Inc.*, 778 F.3d 1021, 1026 (Fed. Cir. 2015); *see also AllVoice Computing PLC v. Nuance Commc'ns, Inc.*, 504 F.3d 1236, 1248 (Fed. Cir. 2007) ("[E]very claim need not contain every feature taught in the specification."). Thus, even if claim 8 did not recite a limitation directed to a signal level threshold, the lack of such a limitation would not support Petitioner's proposed construction.

to a power level having threshold values, not something else having threshold values. We further note that Petitioner's arguments are based on case law giving "comprising" legal effect as a transitional phrase between the preamble and the body of a claim. In contrast, the word "comprising" here is in the body of the claim, so it has "no special legal effect" and "should be interpreted according to the normal rules of claim interpretation." *Moleculon Rsch. Corp. v. CBS, Inc.*, 793 F.2d 1261, 1272 n.8 (Fed. Cir. 1986). Therefore, consistent with *Moleculon*, we interpret "comprising" here as "'having' but not 'having at least.'" *Id.*

We additionally have considered the prosecution history of the '774 patent. Patent Owner notes (PO Remand Br. 3) that the "multitude of threshold values" limitation initially appeared in prosecution claim 17, which is reproduced below.

> 17. The apparatus of claim 16, wherein the power level comprises a multitude of threshold value [sic] determined by a user or system administrator to intermittently activate or deactivate the location tracking circuitry to conserve power of the power charging unit in response to the estimated charge level of the power unit.

Ex. 2019, 372. Patent Owner argues that this prosecution claim corresponds to the embodiment in Figure 4 and evidences an association between the threshold values and "turning the location tracking circuitry on and off," such that "the 'multitude of threshold values' can only be battery power level threshold values." PO Remand Br. 3 (citing Ex. 1001, 11:44–67, 12:32–49, 14:1–57, 15:4–21); PO Remand Resp. 5. Patent Owner also notes (PO Remand Resp. 5) that prosecution claim 16, which is reproduced below, corresponds to the signal level embodiment of Figure 3.

> 16. The apparatus of claim 8, wherein the power charging monitor measures a power level of the power charging unit and adjusts a power level applied to the location tracking circuitry responsive to the signal level.

Ex. 2019, 372. Petitioner does not address the prosecution history. We agree with Patent Owner that the delineation between prosecution claims 16 and 17 provides some support that the "multitude of threshold values" in issued claim 8 relates to battery power levels and not signal levels.[11]

For these reasons, we determine that the "power level" in "the power level comprising a multitude of threshold values" refers to battery power threshold values. In addition, the words of claim 8, the specification of the '774 patent, and the prosecution history all distinguish "signal levels" from battery power levels, which evidences that signal level threshold values are not within the scope of "the power level comprising a multitude of threshold values."

3. Other Terms

We determine that no other terms require explicit construction. *See Realtime Data*, 912 F.3d at 1375.

[11] Prosecution claim 17 depended from prosecution claim 16, which in turn depended from independent prosecution claim 8. *See* Ex. 2019, 370, 372. The Examiner objected to prosecution claim 17 as being dependent upon a rejected base claim, but indicated that it would be allowable if rewritten in independent form including all of the limitations of the base claim and the intervening claim. *Id.* at 107. Accordingly, the patentees amended prosecution claim 8 to include the limitations of prosecution claims 16 and 17. *Id.* at 93–94, 98–99. The amended prosecution claim 8 issued as claim 8 in the '774 patent.

D. Obviousness Ground Based on Sakamoto

Petitioner contends the subject matter of claims 8, 10, 13, and 15 would have been obvious over Sakamoto. Pet. 44–55; Pet. Reply 15–19. Patent Owner disputes Petitioner's contentions. PO Resp. 10–17; PO Sur-reply 11–14.

1. Sakamoto

Sakamoto is a Japanese patent application publication directed to the use of a GPS positioning system that includes a portable terminal and remote server. Ex. 1004, code (57), ¶ 18. Figure 1, reproduced below, is a diagram showing a position information communication terminal.

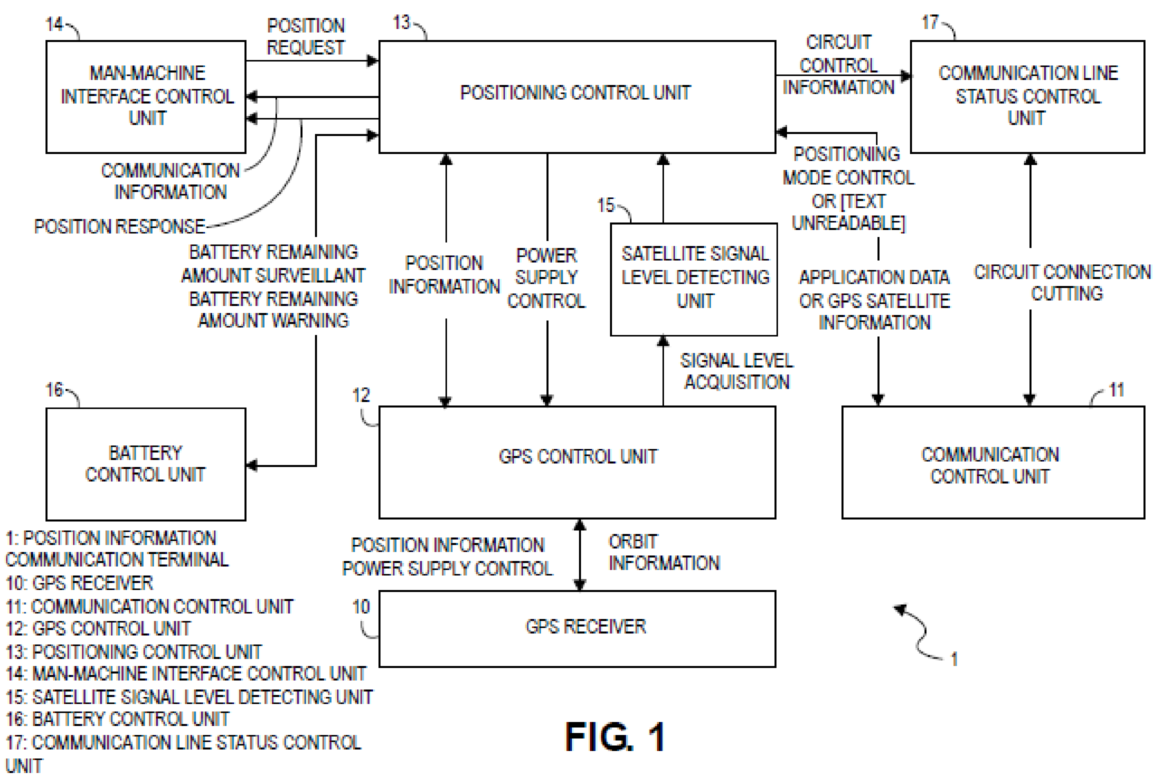

FIG. 1

Figure 1, above, depicts position information communication terminal 1, which includes GPS receiver 10, communication control unit 11 for mobile communications, GPS control unit 12, positioning control unit 13, man-

machine interface control unit 14, satellite signal level detection unit 15, battery control unit 16, and communication line status control unit 17. *Id.* ¶ 19. Battery control unit 16 constantly monitors the remaining battery level. *Id.* ¶ 28. Battery control unit 16 provides positioning control unit 13 a remaining battery life warning when the remaining battery amount falls below a preset threshold value. *Id.* ¶ 19.

Satellite signal level detector 15 detects a level of the GPS signal received by GPS receiver 10 via GPS control unit 12. Ex. 1004 ¶ 19. When the signal level value is equal to or higher than a predetermined threshold value, positioning mode control unit 22 initiates a normal sensitivity positioning mode. *Id.* ¶ 38. Normal sensitivity positioning mode is a mode in which the GPS receiver is operated only when necessary. *Id.* ¶¶ 4–5, 19. When the signal level value is equal to or lower than a predetermined threshold value, positioning mode control unit 22 initiates a high sensitivity positioning mode. *Id.* ¶ 38. High sensitivity positioning mode is a mode in which the GPS receiver is operated constantly. *Id.* ¶¶ 4–5, 19. When the signal level value is equal to or lower than a threshold value associated with the inability to perform positioning, positioning mode control unit 22 stops the position search. *Id.* ¶ 38. A user may select among normal sensitivity positioning mode, high sensitivity positioning mode, and the power-off of terminal 1 via man-machine interface control unit 14. *Id.* ¶¶ 26, 28.

If the GPS satellite signal level detected by satellite signal level detection unit 15 is below threshold value K1, then positioning control unit 13 "automatically makes a transition to the high sensitivity positioning mode." Ex. 1004 ¶ 27. If the GPS satellite signal level detected by satellite signal level detection unit 15 is above a different threshold value K2, then

positioning control unit 13 "automatically makes a transition to the normal sensitivity positioning mode." *Id.*

Figure 2 of Sakamoto is reproduced below.

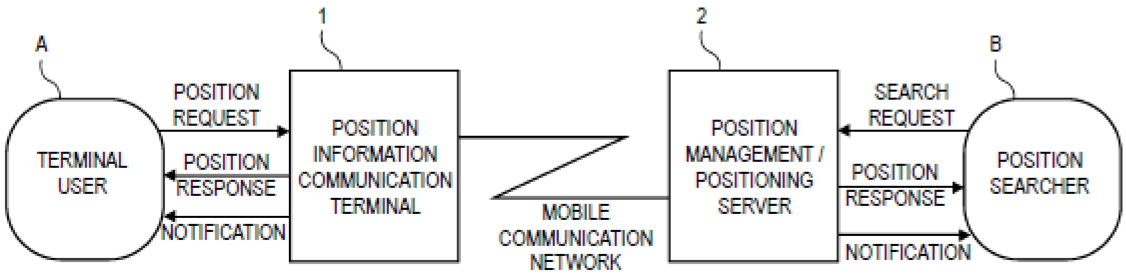

FIG. 2

Figure 2, above, depicts a GPS positioning system with position management/positioning server 2 connected to position information communication terminal 1 by a mobile communication network. Ex. 1004 ¶ 18. Terminal 1 responds to a position request from terminal user A by showing the position of terminal 1 to terminal user A. *Id.* Server 2 responds to a position search request of terminal 1 from position searcher B with a position response. *Id.* Server 2 may also send a position search request message to terminal 1, and terminal 1 responds by sending a search response message including position information to server 2. *See id.* ¶¶ 31–35, Figs. 4, 5.

2. *Claim 8*

a. Petitioner's Contentions

Independent claim 8 recites "[a] local charging management device to manage electrical resource capability for an electronic tracking device that is tracked by at least one other tracking device." Ex. 1001, 16:43–45. For the "local charging management device," Petitioner cites Sakamoto's battery,

battery control unit 16, positioning control unit 13, and GPS control unit 12. Pet. 44. Petitioner maps the "electronic tracking device" to Sakamoto's GPS receiver 10, communication control unit 11, GPS control unit 12, position control unit 13, man-machine interface control unit 14, satellite signal level detecting unit 15, battery control unit 16 and battery, and communication line status controlling unit 17. *Id.* at 13 (citing Ex. 1004 ¶ 19, Fig. 1), 44–45. For "track[ing] by at least one other tracking device," Petitioner contends the "electronic tracking device" is tracked by position management server 2. *Id.* at 44–45; *see also id.* at 15–16 (analyzing similar limitation in claim 1).

Claim 8 further recites "a battery power level monitor." Ex. 1001, 16:46. Petitioner maps this limitation to Sakamoto's battery control unit 16 and GPS control unit 12. Pet. 22–25, 45–46 (citing Ex. 1004, Fig. 1). According to Petitioner, Sakamoto's battery control unit 16 "constantly" monitors a remaining battery amount in order to determine when battery power falls below a predetermined threshold. Pet. 22–24 (citing Ex. 1004 ¶¶ 19, 28, 39).

Claim 8 further recites "a charging unit." Ex. 1001, 16:47. Petitioner cites the battery in Sakamoto's terminal 1 for teaching the recited "charging unit." Pet. 16 (citing Ex. 1004 ¶ 19), 46 (citing Ex. 1004 ¶ 47). In particular, Petitioner relies on the following passage from Sakamoto:

> The position information communication terminal 1 is, as shown in FIG. 1, composed of . . . a battery control unit 16 that notifies the positioning control unit 13 of a remaining battery amount warning when **the remaining amount value of a battery (not shown) that supplies operating power** falls below a preset threshold value.

Id. at 16 (quoting Ex. 1004 ¶ 19) (emphasis by Petitioner).

Claim 8 further recites "an electrical power resource management component to adjust cycle timing of at least one of a request rate of location coordinate packets to a target host and a listen rate of the location coordinate packets responsive to an estimated charge level of the charging unit." Ex. 1001, 16:48–52. According to Petitioner, the '774 patent states that a local battery adjustment mechanism is one example of an "electrical resource management component." Pet. 46 (citing Ex. 1001, 13:13–15). As such, Petitioner cites its analysis from claim 1 in which it maps a local battery power adjustment mechanism to Sakamoto's man-machine interface control unit 14 and positioning control unit 13. Pet. 26–27 (citing Ex. 1004, Fig. 1), 46. Petitioner contends these elements "act in concert to reduce (*i.e.,* 'adjust') the battery usage of *Sakamoto's* terminal." *Id.* at 27 (citing Ex. 1004 ¶ 46).

Petitioner explains that a user sets a "preset threshold value" using man-machine interface control unit 14 "to specify the battery level below which the terminal will automatically switch from high sensitivity positioning mode to normal sensitivity positioning mode." *Id.* at 27–28 (citing Ex. 1004 ¶¶ 29, 46), 47. Based on this threshold value, positioning control unit 13 switches between the high sensitivity positioning mode and the normal sensitivity positioning mode by turning on and off the GPS receiver according to the current positioning mode. *Id.* at 28 (citing Ex. 1003 ¶ 87; Ex. 1004 ¶¶ 20, 24), 47. Petitioner further contends that an ordinarily skilled artisan "would have appreciated that switching the positioning mode updates the communication signaling protocol." *Id.* at 31 (citing Ex. 1003 ¶¶ 89–94), 47 (citing Ex. 1003 ¶¶ 98, 102); *see also id.* at 29–30 (same argument); Pet. Reply 15 (same argument). Petitioner

associates "adjust[ing] cycle timing" of the request rate and/or listen rate with generating such an updated set of communication signaling protocols. Pet. 46–47 (citing Ex. 1003 ¶ 98).

For the recited "listen rate," Petitioner notes that, after an initial position request, "high-sensitivity positioning mode keeps the GPS continuously powered on, 'constantly' updating the position of the terminal," so an ordinarily skilled artisan would have known the GPS receiver to have "an associated refresh rate of location coordinates (commonly 1Hz)." Pet. 31 (citing Ex. 1003 ¶ 90; Ex. 1004 ¶¶ 20, 25, 31, 36), 46–47 (relying on analysis from claim 1). Petitioner further notes that, in Sakamoto's normal sensitivity positioning mode, GPS receiver 10 is powered on and off in response to requests at man-machine interface control unit 14, which Petitioner characterizes as regular or irregular. *Id.* at 32–33 (citing Ex. 1003 ¶ 92; Ex. 1004 ¶¶ 24, 34). Petitioner additionally notes that Sakamoto discloses search requests made during a regular "short cycle." *Id.* at 33 (citing, *inter alia*, Ex. 1004 ¶ 40). Furthermore, Petitioner notes that even when no positioning request is pending, the server may periodically (i.e., at a "cycle set in advance") send a satellite signal level request message, which "causes the terminal to monitor the satellite signal level for a specified length of time and send a 'satellite signal level response message' with signal strength data to the server." *Id.* at 32 (citing Ex. 1004 ¶ 37). As such, Petitioner contends an ordinarily skilled artisan would have understood that the periodic satellite signal request message cycle is "a minimum value for the listen rate of the GPS receiver in normal sensitivity position." *Id.* (citing Ex. 1003 ¶ 92). Finally, Petitioner asserts that the

listen rate for GPS signals is zero when the GPS receiver is in power-off mode. *Id.* at 33–34 (citing Ex. 1003 ¶ 94; Ex. 1004 ¶¶ 28, 39, 51).

For the "request rate," Petitioner contends that search response messages in Sakamoto's normal and high sensitivity modes "are generated in response to a position search request message and as such may be generated in response to a request by a position searcher or repeatedly in a 'short cycle.'" Pet. 33 (citing Ex. 1004 ¶¶ 31–35, 40, 53), 46–47 (relying on analysis from claim 1). In light of this, Petitioner contends that an ordinarily skilled artisan "would have understood that the communication signaling protocol associated with normal sensitivity positioning mode has a response rate that may be irregular (based on manual searches) or regular (at a predefined cycle frequency)." *Id.* at 33 (citing Ex. 1003 ¶¶ 91–92). Petitioner also contends that an ordinarily skilled artisan would have known that the response rate for requests is zero in power-off mode "because GPS signal levels are not monitored and position searching is stopped." *Id.* at 34 (citing Ex. 1003 ¶ 94; Ex. 1004 ¶ 38). Petitioner provides a chart, reproduced below, summarizing its "request rate" and "listen rate" mappings to Sakamoto's teachings.

Communication signaling protocol	**GPS Listen Rate**	**Response Rate (to Request Rate of Location Coordinate Packets)**
High sensitivity positioning mode	Maximum GPS refresh rate (*e.g.*, 1Hz)	irregular request rate or regular "short cycle"
Normal sensitivity positioning mode	irregular request rate, regular "short cycle," or "cycle set in advance"	irregular request rate or regular "short cycle"
Power-off mode	0Hz	0Hz

Id. In this chart from the Petition, Petitioner has listed its contentions regarding the "GPS Listen Rate" and "Response Rate (to Request Rate of Location Coordinate Packets)" for Sakamoto's high and normal sensitivity modes and power-off mode. *Id.*

Claim 8 further recites

> wherein the battery power level monitor measures a power level of the charging unit and adjusts a power level applied to location tracking circuitry responsive to one or more signal levels, the power level comprising a multitude of threshold values determined by a user or system administrator to intermittently activate or deactivate the location tracking circuitry to conserve power of the charging unit in response to the estimated charge level of the charging unit.

Ex. 1001, 16:53–61. Petitioner contends "*Sakamoto* teaches battery control unit 16 measures a power level of the battery." Pet. 48 (citing Ex. 1003 ¶ 101); *see also id.* at 23–24 (citing Ex. 1004 ¶¶ 28, 39). For "adjust[ing] a power level applied to location tracking circuitry," Petitioner cites Sakamoto's teaching of changing the power level applied to GPS receiver 10 depending on positioning mode. *Id.* at 48–49 (citing Ex. 1004 ¶¶ 24, 25). Petitioner contends the adjustment to GPS receiver 10 is "responsive to one or more signal levels" based on Sakamoto's detection of GPS satellite signal levels and teachings of (1) threshold K1, below which positioning control unit 13 automatically transitions to high sensitivity positioning mode; and (2) threshold K2, above which positioning control unit 13 automatically transitions to normal sensitivity positioning mode. *Id.* at 49–50 (citing Ex. 1004 ¶ 27).

For the recited "multitude of threshold values," Petitioner initially cited Sakamoto's teachings of two battery power level thresholds related to (1) the user-defined battery power level threshold below which the mode

switches from high sensitivity positioning mode to normal sensitivity positioning mode; and (2) "a still lower-power mode whereby the GPS receiver is completely shut down." Pet. 50–51 (citing Ex. 1004 ¶¶ 29, 39, 51). Regarding the "still-lower power mode," Petitioner contends an ordinarily skilled artisan "would have understood these teachings of *Sakamoto* to indicate a second battery threshold below which this complete GPS power off occurs." *Id.* at 51 (citing Ex. 1003 ¶ 103).

In its Reply, Petitioner cites two additional thresholds associated with a GPS signal level for teaching the "multitude of threshold values." Pet. Reply 16. According to Petitioner,

> *Sakamoto* teaches that the power level applied to the GPS receiver can be increased (to set the GPS receiver to high sensitivity positioning mode) when the GPS signal level is below a predetermined threshold K1, or decreased (to set the GPS receiver to normal sensitivity mode) when GPS signal level exceeds "a threshold value K2 different from the threshold value K1."

Id. at 16–17 (quoting Ex. 1004 ¶ 27) (citing Ex. 1003 ¶ 58). Petitioner explains that "[t]hese GPS signal level thresholds are used as the basis to 'intermittently activate or deactivate the location tracking circuitry' for the same reasons discussed in the Petition with respect to the battery level thresholds at least because Sakamoto uses the same modes with both sets of thresholds." *Id.* at 17. Petitioner contends that all of its cited thresholds, including K1 and K2, "are used to transition positioning mode and therefore adjust the cycle timing." *Id.*

b. Patent Owner's Arguments

Patent Owner argues that "*Sakamoto* does not disclose more than two thresholds of any one type." PO Sur-reply 13. Patent Owner further argues that it is "improper to combine thresholds unrelated to the power level." *Id.* As such, Patent Owner concludes that "the combination of *Sakamoto's* two power level-related thresholds and two signal-related thresholds to achieve four thresholds, as proposed by Petitioner, is insufficient to disclose this limitation." *Id.* at 14.

c. Analysis

Petitioner cites Sakamoto's two battery power level thresholds (i.e., the battery power thresholds between (1) high and normal sensitivity positioning modes and (2) normal sensitivity positioning mode and turning off power to the GPS receiver) and Sakamoto's two GPS signal level thresholds (i.e., K1 and K2) for teaching "the power level comprising a multitude of threshold values." Pet. 50–51; Pet. Reply 16–18. As discussed above, however, "the power level comprising a multitude of threshold values" refers to battery power level thresholds. *See supra* § II.C.2. We also determine above that signal level threshold values are not within the scope of "the power level comprising a multitude of threshold values." *See id.* Accordingly, we are not persuaded that Sakamoto's GPS signal level thresholds K1 and K2 teach the recited power level threshold values. Although Petitioner is correct that "*Sakamoto* uses the same modes with both sets of thresholds" and that both sets of thresholds might ultimately relate to conserving battery power (*see* Pet. Reply 17 (citing Ex. 1003 ¶ 58; Ex. 1004 ¶¶ 27–29)), we are not persuaded that these different types of

thresholds are interchangeable within the scope of "the power level comprising a multitude of threshold values." This is particularly true given that Petitioner already relies on Sakamoto's GPS signal level thresholds K1 and K2 for teaching another aspect of claim 8, i.e., "responsive to one or more signal levels." *See* Pet. 49–50.

For these reasons, Petitioner has only established that Sakamoto teaches two battery power level thresholds within the scope of "the power level comprising a multitude of threshold values." Because two threshold values are not a "multitude" (*see supra* § II.C.1), we find that Petitioner has not established that Sakamoto teaches "the power level comprising a multitude of threshold values," as recited in claim 8. Thus, we determine Petitioner has not shown by a preponderance of the evidence that the subject matter of claim 8 would have been obvious over Sakamoto.

3. *Claims 10, 13, and 15*

Claims 10, 13, and 15 each depend from claim 8. Ex. 1001, 17:4–10, 17:23–25, 17:29–33. Petitioner's analysis for these claims does not cure the deficiencies discussed above with respect to claim 8. *See* Pet. 54–55. Thus, we determine Petitioner has not shown by a preponderance of the evidence that the subject matter of claims 10, 13, and 15 would have been obvious over Sakamoto.

E. *Obviousness Ground Based on Sakamoto and AAPA*

Petitioner contends the subject matter of claims 8, 10, 13, and 15 would have been obvious over the combination of Sakamoto and AAPA. Pet. 60. Petitioner's further analysis based on AAPA does not cure the

deficiencies discussed above with respect to claims 8, 10, 13, and 15 in the Sakamoto obviousness ground. *See supra* §§ II.D.2–3. Thus, we determine Petitioner has not shown by a preponderance of the evidence that the subject matter of claims 8, 10, 13, and 15 would have been obvious over the combination of Sakamoto and AAPA.

F. Obviousness Ground Based on Sakamoto and Hayasaka

Petitioner contends the subject matter of claims 8, 10, 13, and 15 would have been obvious over the combination of Sakamoto and Hayasaka. Pet. 70–71. Petitioner's further analysis based on Hayasaka does not cure the deficiencies discussed above with respect to claims 8, 10, 13, and 15 in the Sakamoto obviousness ground. *See supra* §§ II.D.2–3. Thus, we determine Petitioner has not shown by a preponderance of the evidence that the subject matter of claims 8, 10, 13, and 15 would have been obvious over the combination of Sakamoto and Hayasaka.

III. CONCLUSION

Petitioner has not shown, by a preponderance of the evidence, that (1) the subject matter of claims 8, 10, 13, and 15 would have been obvious over Sakamoto; (2) the subject matter of claims 8, 10, 13, and 15 would have been obvious over the combination of Sakamoto and AAPA; or (3) the subject matter of claims 8, 10, 13, and 15 would have been obvious over the combination of Sakamoto and Hayasaka.

In summary:

Claims	**35 U.S.C. §**	**Reference(s)/Basis**	**Claims Shown Unpatentable**	**Claims Not shown Unpatentable**
8, 10, 13, 15	103(a)	Sakamoto		8, 10, 13, 15
8, 10, 13, 15	103(a)	Sakamoto, AAPA		8, 10, 13, 15
8, 10, 13, 15	103(a)	Sakamoto, Hayasaka		8, 10, 13, 15
Overall Outcome				8, 10, 13, 15

IV. ORDER

Accordingly, it is

ORDERED that claims 8, 10, 13, and 15 of the ’774 patent are not unpatentable; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to this proceeding seeking judicial review of our decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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Prosecution History IPR2020-01189

Date	Document
07/22/2020	Petition for Inter Partes Review of US Patent No. 8,497,774
07/22/2020	Petitioner's Power of Attorney
08/10/2020	Patent Owner's Mandatory Notices
08/10/2020	Patent Owner's Power of Attorney
09/09/2020	Notice of Accord Filing Date
12/09/2020	Patent Owner's Amended Mandatory Notices
12/09/2020	Patent Owner's Amended Power of Attorney
12/09/2020	Patent Owner's Preliminary Response to Petition for Inter Partes Review of U.S. Patent No. 8,497,774
03/04/2021	Decision Granting Institution of Inter Partes Review
03/04/2021	Scheduling Order
05/02/2021	Patent Owner's Notice of Deposition to Scott Andrews
05/11/2021	Patent Owner's Unopposed Motion for Pro Hac Vice Admission
05/21/2021	Order - Conduct of the Proceeding
05/21/2021	Order - Conduct of Proceeding (MTA Conference Call)
05/27/2021	Petitioner's Opposition to Patent Owners Motion For Admission Pro Hac Vice of Brian S. Seal
06/01/2021	Patent Owner's Motion to Amend
06/01/2021	Patent Owner's Response to Petition for Inter Partes Review of U.S. Patent No. 8,497,774
06/04/2021	Patent Owner's Unopposed Motion for Pro Hac Vice Admission
06/04/2021	Patent Owner's Reply in Support of Pro Hac Vice Motion
06/16/2021	Order Granting Patent Owner's Motion for Pro Hac Vice Admission of Brian S. Seal
06/23/2021	Patent Owner's Updated Power of Attorney
06/23/2021	Patent Owner's Updated Mandatory Notices
08/16/2021	Order - Conduct of the Proceeding
08/30/2021	Petitioner's Reply to Patent Owner's Response
08/30/2021	Petitioner's Opposition to Patent Owner's Motion to Amend
09/13/2021	Patent Owner's Updated Mandatory Notices
09/24/2021	Preliminary Guidance - Patent Owner's Motion to Amend
10/01/2021	Petitioner's Revised Joint Stipulation to Modify Due Dates 2 and 3
10/12/2021	Patent Owner's Reply to Petitioner's Opposition to Patent Owner's Motion to Amend
10/12/2021	Patent Owner's Sur-Reply to Petitioner's Reply
10/25/2021	Petitioner's Request for Oral Argument
10/26/2021	Patent Owner's Request for Oral Hearing
10/26/2021	Patent Owner's Revised Request for Oral Hearing
11/09/2021	Order Granting Requests for Oral Argument
11/19/2021	Petitioner's Sur-Reply to Patent Owner's Reply to Petitioner's Opposition to Motion to Amend
11/22/2021	Patent Owner's Mandatory Notice

01/06/2022	Hearing Transcript
03/02/2022	Final Written Decision Judgment Final Written Decision
04/07/2022	Patent Owner's Notice of Appeal
07/24/2023	CAFC Mandate
07/24/2023	CAFC Opinion
08/22/2023	Order - Conduct of the Proceeding
09/06/2023	Patent Owner's Opening Brief on Remand
09/06/2023	Petitioner's Opening Remand Brief
09/20/2023	Petitioner's Reply Remand Brief
09/20/2023	Patent Owner's Reply Brief on Remand
12/15/2023	Order Determining No Remaining Challenged Claims Unpatentable

US008497774B2

(12) **United States Patent**
Scalisi et al.

(10) **Patent No.: US 8,497,774 B2**
(45) **Date of Patent: Jul. 30, 2013**

(54) **APPARATUS AND METHOD FOR ADJUSTING REFRESH RATE OF LOCATION COORDINATES OF A TRACKING DEVICE**

(75) Inventors: **Joseph F. Scalisi**, Yorba Linda, CA (US); **Roger B. Anderson**, Arcadia, CA (US)

(73) Assignee: **Location Based Technologies Inc.**, Irvine, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 992 days.

(21) Appl. No.: **12/419,451**

(22) Filed: **Apr. 7, 2009**

(65) **Prior Publication Data**

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Related U.S. Application Data

(63) Continuation-in-part of application No. 11/969,905, filed on Jan. 6, 2008, now Pat. No. 8,102,256, and a continuation-in-part of application No. 11/753,979, filed on May 25, 2007, and a continuation-in-part of application No. 11/933,024, filed on Oct. 31, 2007, and a continuation-in-part of application No. 11/784,400, filed on Apr. 5, 2007, now abandoned, and a continuation-in-part of application No. 11/935,901, filed on Nov. 6, 2007, now Pat. No. 8,244,468, and a continuation-in-part of application No. 11/784,318, filed on Apr. 5, 2007, now abandoned.

(51) **Int. Cl.**
G08B 1/08 (2006.01)

(52) **U.S. Cl.**
USPC **340/539.13**

(58) **Field of Classification Search**
USPC 340/539.13, 539.21, 686.1, 636.1, 340/636.2, 636.19; 320/108
See application file for complete search history.

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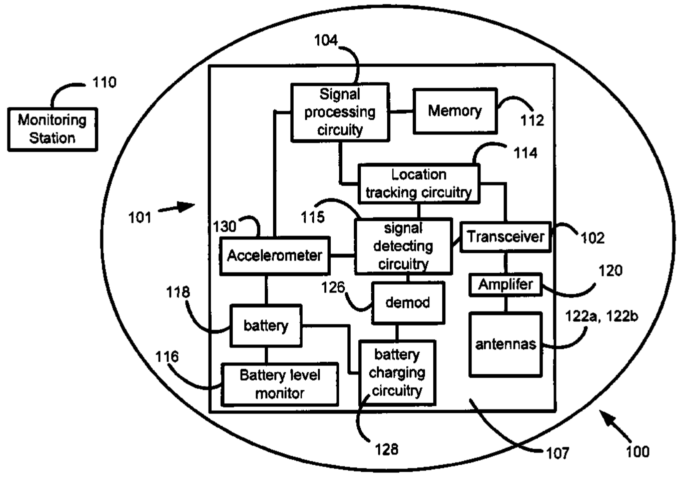
(57) **ABSTRACT**

A local charging management device manages electrical resource capability for an electronic tracking device. In one embodiment, the electronic tracking device includes a battery power monitor, a charging unit; and an electrical power resource management component. The electrical power resource management component adjusts cycle timing of one or more of control parameters for the tracking device. Control parameters include request rate of location coordinate packets to a target host and a listen rate of the location coordinate packets. The adjustment is responsive to an estimated charge level of the charging unit, velocity of the device, and user desired inputs.

19 Claims, 7 Drawing Sheets



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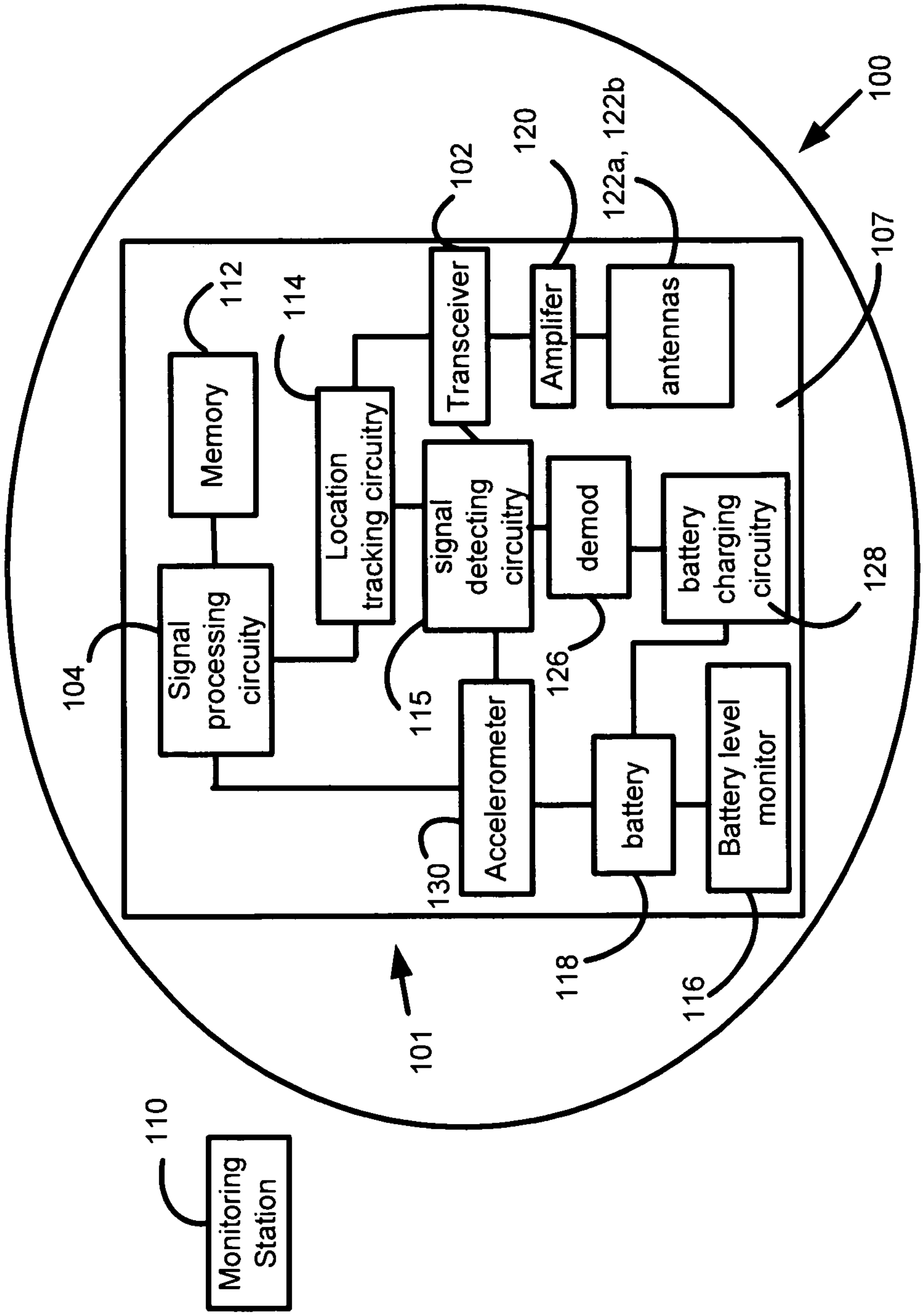

100
101
102
Transceiver
104
Signal processing circuity
107
110
Monitoring Station
112
Memory
114
Location tracking circuitry
115
signal detecting circuitry
116
Battery level monitor
118
battery
120
Amplifer
122a, 122b
antennas
126
demod
128
battery charging circuitry
130
Accelerometer

Figure 1

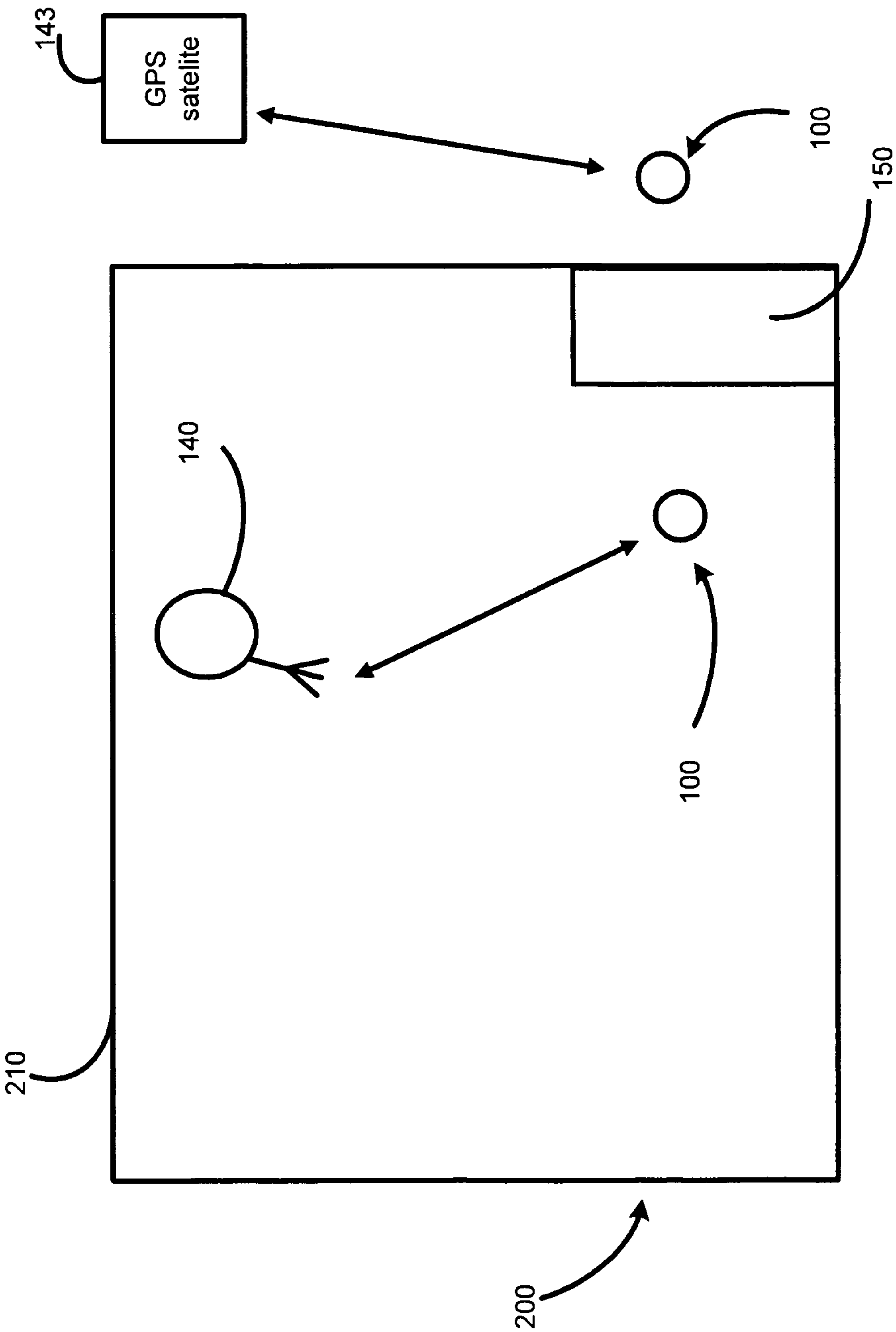


Figure 2

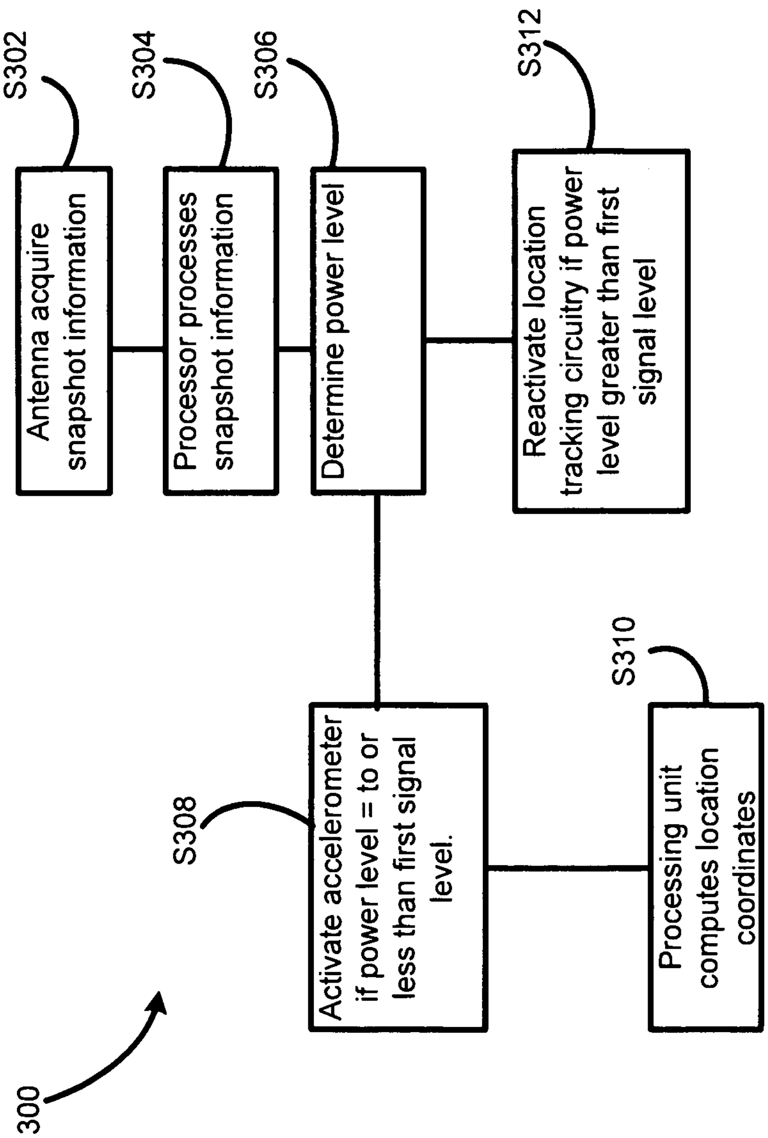
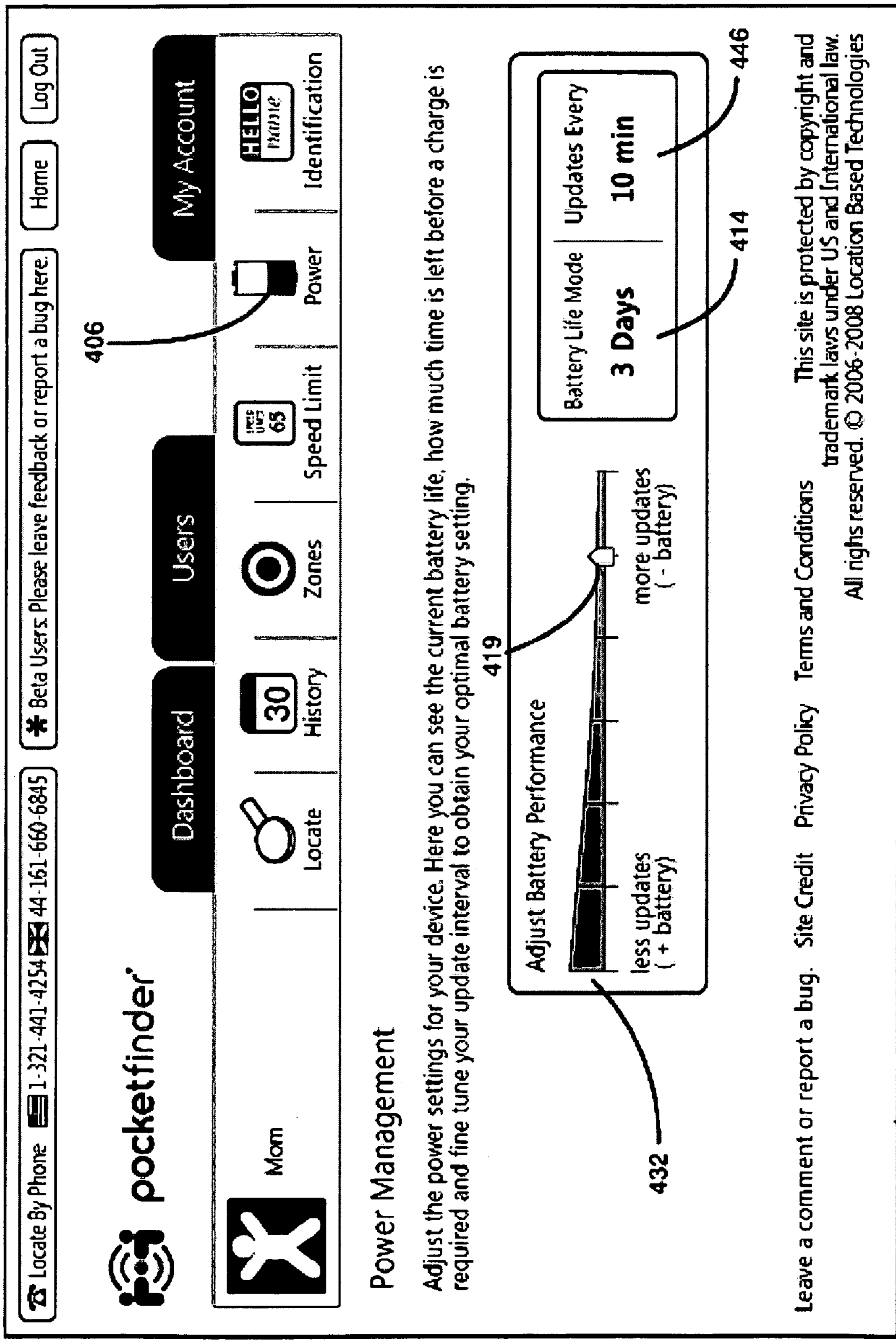
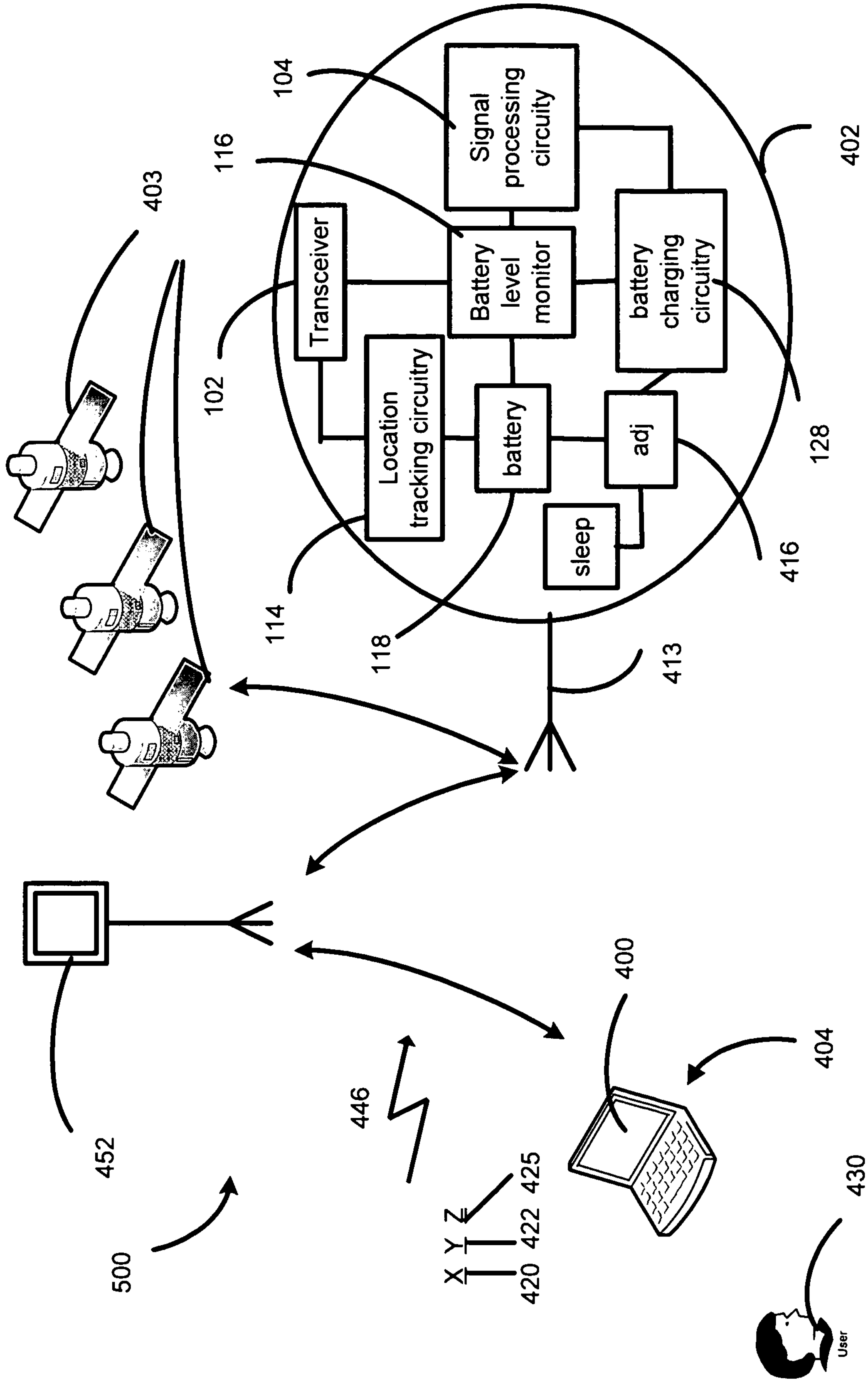

S302
Antenna acquire snapshot information
S304
Processor processes snapshot information
S306
Determine power level
S312
Reactivate location tracking circuitry if power level greater than first signal level
S308
Activate accelerometer if power level = to or less than first signal level.
S310
Processing unit computes location coordinates
300

Figure 3



Locate By Phone 1-321-441-4254 44-161-660-6845
Beta Users: Please leave feedback or report a bug here.
Home
Log Out
pocketfinder
Dashboard
Users
My Account
Mom
Locate
30
History
Zones
65
Speed Limit
Power
HELLO
Identification
406
Power Management
Adjust the power settings for your device. Here you can see the current battery life, how much time is left before a charge is required and fine tune your update interval to obtain your optimal battery setting.
419
Adjust Battery Performance
less updates (+ battery)
more updates (- battery)
Battery Life Mode
3 Days
Updates Every
10 min
414
446
432
Leave a comment or report a bug. Site Credit Privacy Policy Terms and Conditions
This site is protected by copyright and trademark laws under US and International law.
All righs reserved. © 2006-2008 Location Based Technologies
400

Figure 4



Signal processing circuity
Battery level monitor
battery charging circuitry
Transceiver
Location tracking circuitry
battery
adj
sleep
104
116
102
114
118
402
128
416
413
403
400
404
446
452
500
425
422
420
430
X
Y
Z
User

Figure 5

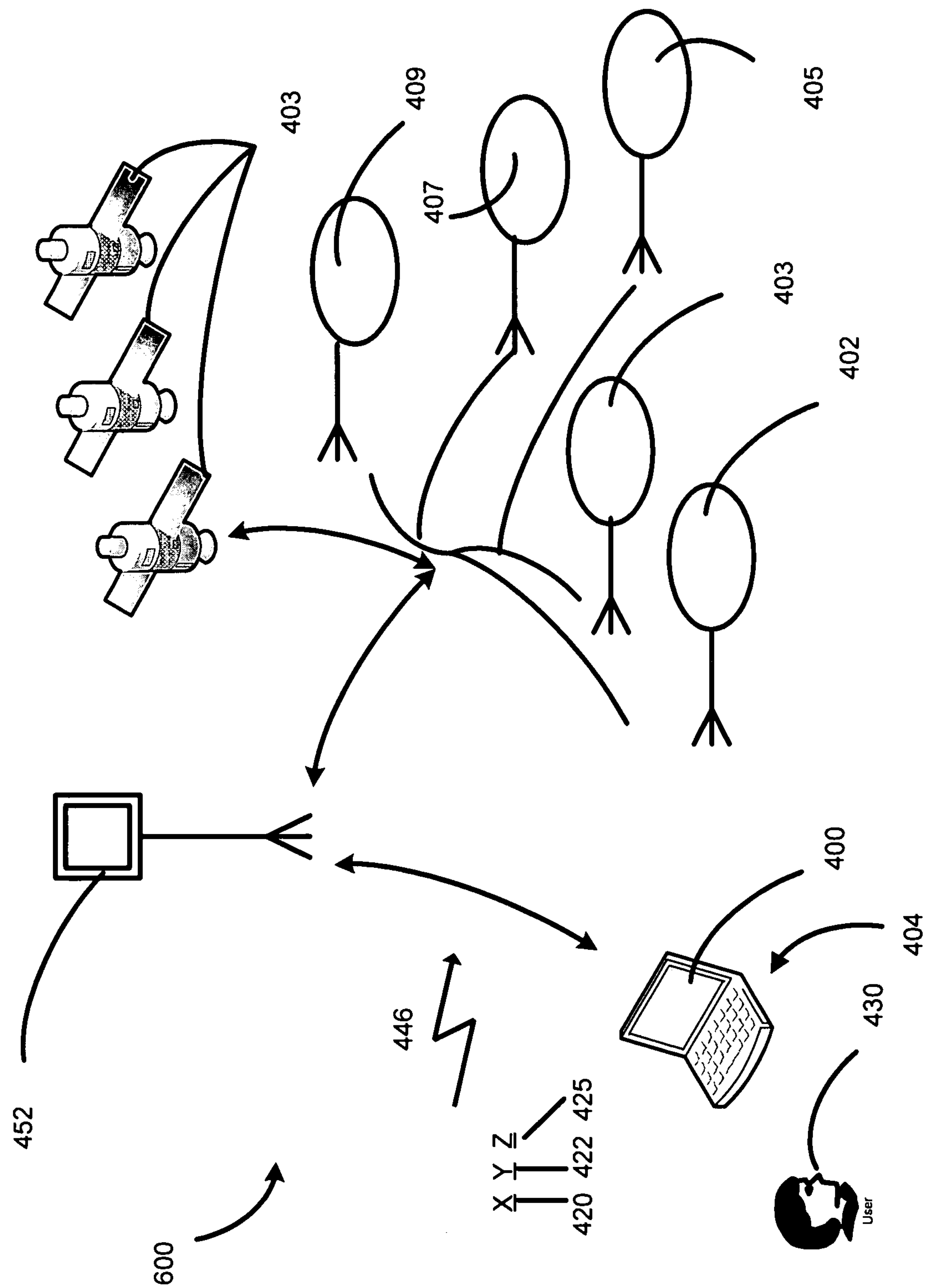

403
409
405
407
403
402
400
404
430
446
452
X Y Z
420
422
425
600
User

Figure 6

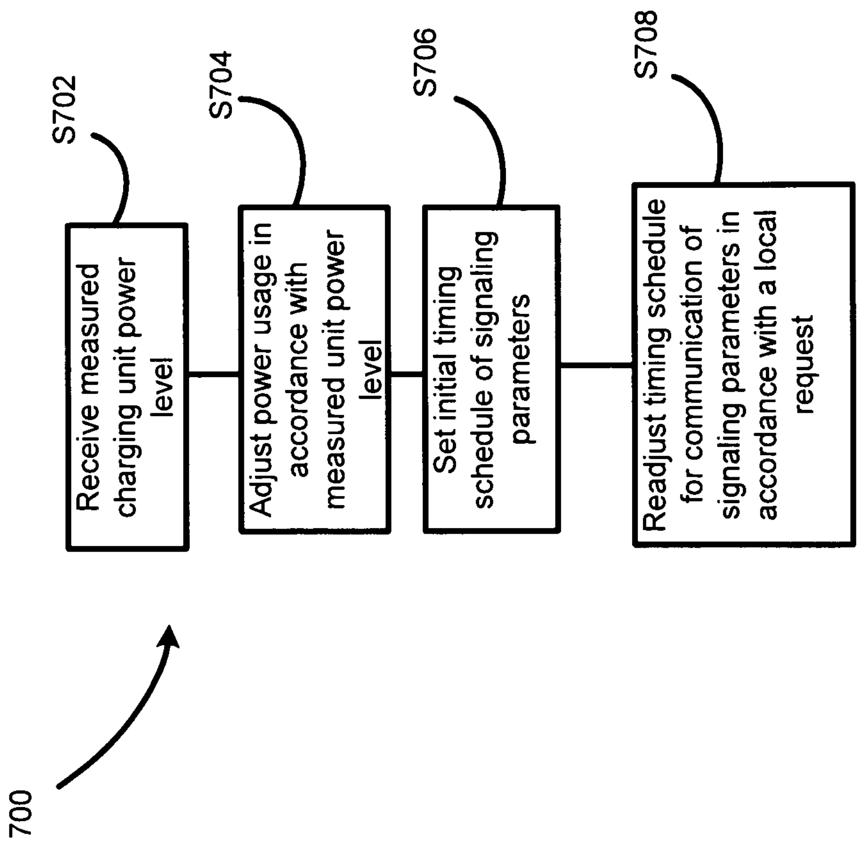

700
S702
Receive measured charging unit power level
S704
Adjust power usage in accordance with measured unit power level
S706
Set initial timing schedule of signaling parameters
S708
Readjust timing schedule for communication of signaling parameters in accordance with a local request

Figure 7

APPARATUS AND METHOD FOR ADJUSTING REFRESH RATE OF LOCATION COORDINATES OF A TRACKING DEVICE

PRIORITY AND RELATED APPLICATIONS

This application is a continuation-in-part of and claims priority to U.S. Pat. No. 8,102,256, originally filed as U.S. patent application Ser. No. 11/969,905 entitled "Apparatus and Method for Determining Location and Tracking Coordinates of a Tracking Device" that was filed on Jan. 6, 2008; and incorporates by reference in their entirety and claims priority to: U.S. patent application Ser. No. 11/753,979 filed on May 25, 2007, entitled "Apparatus and Method for Providing Location Information on Individuals and Objects Using Tracking Devices"; U.S. patent application Ser. No. 11/933,024 filed on Oct. 31, 2007, entitled "Apparatus and Method for Manufacturing an Electronic Package"; U.S. patent application Ser. No. 11/784,400 filed on Apr. 5, 2007, entitled "Communication System and Method Including Dual Mode Capability"; U.S. patent application Ser. No. 11/784,318 filed on Apr. 5, 2007, entitled "Communication System and Method Including Communication Billing Options"; and U.S. Pat. No. 8,244,468, originally filed as U.S. patent application Ser. No. 11/935,901 filed on Nov. 6, 2007, entitled "System and Method for Creating and Managing a Personalized Web Interface for Monitoring Location Information on Individuals and Objects Using Tracking Devices."

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates generally to the field of location and tracking communication systems. More particularly, the present invention relates in one embodiment to a power conservation methodology and apparatus incorporated as part of portable electronic tracking device for individuals and objects to improve battery life by a wireless location and tracking system and/or wireless communication system (WCS).

2. Description of Related Technology

Accelerometers are conventionally integrated into electronics systems that are part of a vehicle, vessel, and airplane to detect, measure, and monitor deflections, vibrations, and acceleration. Accelerometers, for example, may include one or more Micro Electro-Mechanical System (MEMS) devices. In particular, MEMS devices include one or more suspended cantilever beams (e.g., single-axis, dual-axis, and three-axis models), as well as deflection sensing circuitry. Accelerometers are utilized by a multitude of electronics manufacturers.

For instance, electronics gaming manufacturers exploit an accelerometer's deflection sensing capability, for instance, to measure device tilt and control game functionality. In another instance, consumer electronics manufacturers, e.g., Apple, Ericsson, and Nike, incorporate accelerometers in personal electronic devices, e.g., Apple iPhone to provide a changeable screen display orientation that toggles between portrait and landscape layout window settings; to manage human inputs through a human interface, e.g., Apple iPod® touch screen interface; and to measure game movement and tilt, e.g., Wii gaming remotes. Still others including automobile electronics circuitry manufacturers utilize MEMS accelerometers to initiate airbag deployment in accordance with a detected collision severity level by measuring negative vehicle acceleration.

Other electronics manufacturer products, e.g., Nokia 5500 sport, count step motions using a 3D accelerometer, and translate user information via user's taps or shaking motion to select song titles and to enable mp3 player track switching. In another instance, portable or laptop computers include hard-disk drives integrated with an accelerometer to detect displacement or falling incidents. For instance, when a hard-disk accelerometer detects a low-g condition, e.g., indicating free-fall and expected shock, a hard-disk write feature may be temporarily disabled to avoid accidental data overwriting and prevent stored data corruption. After free-fall and expected shock, the hard-disk write feature is enabled to allow data to be written to one or more hard-disk tracks. Still others including medical product manufacturers utilize accelerometers to measure depth of Cardio Pulmonary Resuscitation (CPR) chest compressions. Sportswear manufacturers, e.g., Nike sports watches and footwear, incorporate accelerometers to feedback speed and distance to a runner via a connected iPod® Nano.

Still others including manufacturers of conventional inertial navigation systems deploy one or more accelerometers as part of, for instance, on-board electronics of a vehicle, vessel, train and/or airplane. In addition to accelerometer measurements, conventional inertial navigation systems integrate one or more gyroscopes with the on-board electronics to assist tracking including performing various measurements, e.g., tilt, angle, and roll. More specifically, gyroscopes measure angular velocity, for instance, of a vehicle, vessel, train, and/or airplane in an inertial reference frame. The inertial reference frame, provided, for instance, by a human operator, a GPS receiver, or position and velocity measurements from one or more motion sensors.

More specifically, integration of measured inertial accelerations commences with, for instance, original velocity, for instance, of a vehicle, vessel, train, and/or airplane to yield updated inertial system velocities. Another integration of updated inertial system velocities yields an updated inertial system orientation, e.g., tilt, angle, and roll, within a system limited positioning accuracy. In one instance to improve positioning accuracy, conventional inertial navigation systems utilize GPS system outputs. In another instance to improve positioning accuracy, conventional inertial navigation systems intermittently reset to zero inertial tracking velocity, for instance, by stopping the inertial navigation system. In yet other examples, control theory and Kalman filtering provide a framework to combine motion sensor information in attempts to improve positional accuracy of the updated inertial system orientation.

Potential drawbacks of many conventional inertial navigation systems include electrical and mechanical hardware occupying a large real estate footprint and requiring complex electronic measurement and control circuitry with limited applicably to changed environmental conditions. Furthermore, many conventional inertial navigation system calculations are prone to accumulated acceleration and velocity measurement errors. For instance, many conventional inertial navigation acceleration and velocity measurement errors are on the order of 0.6 nautical miles per hour in position and tenths of a degree per hour in orientation.

In contrast to conventional inertial navigation systems, a conventional Global Positioning Satellite (GPS) system uses Global Positioning Signals (GPS) to monitor and track location coordinates communicated between location coordinates monitoring satellites and an individual or an object having a GPS transceiver. In this system, GPS monitoring of location coordinates is practical when a GPS transceiver receives at least a minimal GPS signal level. However, a minimal GPS signal level may not be detectable when an individual or object is not located in a skyward position. For instance, when an individual or object carrying a GPS transceiver enters a

covered structure, e.g., a garage, a parking structure, or a large building, GPS satellite communication signals may be obstructed or partially blocked, hindering tracking and monitoring capability. Not only is a GPS transceiver receiving a weak GPS signal, but also the GPS transceiver is depleting battery power in failed attempts to acquire communication signals from one or more location coordinates monitoring satellites, e.g., GPS satellites, or out-of-range location coordinates reference towers. Furthermore, weak GPS communication signals may introduce errors in location coordinates information.

In addition during the acquisition of signaling and or other information, a conventional GPS transceiver has limited functionality or capabilities associated with control and monitoring of battery power usage. For instance, a conventional GPS transceiver may have some indication battery charge level such as a power level bar but have very few or any ability or capability to control or reduce power usage. Furthermore, often users do not realize or are only alerted when their GPS transceiver is using reserve power or about to suddenly involuntarily shut-down to prevent data loss and loss of other user information such as personal GPS settings, screen color displays, and user recreational or pleasure settings.

More specifically, users of conventional GPS transceivers typically are unprepared for such a sudden loss of GPS transceiver service. Generally, within minutes of an initial warning indication, e.g., beeping, vibration, voice, alarms or combination thereof, the GPS transceiver shuts off. As such, a user may suddenly experience loss of location determination or location based capabilities or monitoring or being monitored capabilities and not prepared for such sudden outage. Furthermore, even if a user could reduce battery power usage, a result, within the last few minutes of battery power, a user has little or no incentive or capability to alter battery usage of a conventional GPS transceiver due to low power level GPS transceivers may suddenly become non-operational without any warning to or recourse to a user. Thus, when a conventional GPS transceiver is low in power level, a user's most viable alternative would be locating an electrical outlet to recharge their conventional GPS transceiver.

In summary, electronic tracking device and methodology that provides additional advantages over conventional systems such as improved power management, e.g., efficient use of battery power and provide other improvements include supplementing conventional electronic tracking device monitoring, e.g., increased measurement accuracy of location coordinates of objects and individuals traveling into and/or through a structure, e.g., a partially covered building, a parking structure, or a substantially enclosed structure, such as a basement or a storage area in a high-rise office building.

SUMMARY OF THE INVENTION

In a first aspect of the present invention, a portable electronic apparatus for a tracking device is disclosed. In one embodiment, the tracking device includes a battery having a battery charge level, transceiver circuitry, processor circuitry, and a battery power monitor. In one embodiment, the battery power monitor measures in real-time the battery charge level and makes a prediction of an estimated remaining battery charge level in response to the battery charge level.

In one variant, a local battery power adjustment mechanism generates in substantially real-time an updated set of network communication signaling protocols associated with at least one of a request rate of location coordinate packets to be communicated to a target host and a listen rate of the location coordinate packets. In yet another variant, the updated set of network communication signaling protocols has a value that is responsive to a user input request. In yet another embodiment, the local battery power adjustment mechanism activates or deactivates one or more portions of the transceiver circuitry to conserve the battery charge level. In yet another embodiment, the local battery power adjustment mechanism activates or deactivates the processor to conserve the battery charge level in response to the value having the value responsive to a user input request.

In a second aspect of the present invention, a local charging management device is disclosed to manage electrical resource capability for an electronic tracking device that is tracked by at least one other tracking device. In one embodiment, local charging management device includes a battery power monitor, a charging unit; and an electrical power resource management component. In one variant, the power resource management component adjusts cycle timing of a request rate of location coordinate packets communicated to a target host responsive to an estimate charge level of the charging unit. In another variant, the power resource management component adjusts a listen rate of location coordinate packets responsive to an estimated charge level of the charging unit. In yet another variant, the power resource management component adjusts one or more of request rate of location coordinate packets to a target host and a listen rate of location coordinate packets responsive to an estimated charge level of the charging unit.

In another aspect of the present invention, a method is disclosed to control power usage. In one embodiment, the method includes measurement of charging unit power level of a tracking device communicated by a location coordinate tracking system, and adjustment of charging unit power level of the tracking device in response to a substantially-real life estimate of the unit power level of a charge unit of the tracking device. In one variant, the method includes creation of an initial timing schedule for communication of signaling parameters associated with a request rate communicated with location coordinate information and listen rate communicated with the location coordinate information, the initial time schedule being at least partially automatically and responsive to an estimated power level of the charge unit. In yet another variant, the method includes readjustment of the initial timing schedule for communication of signaling parameters in accordance with a local request by a remote user using an Internet accessible icon that displays user viewable tradeoffs between the estimated charge unit life and charge unit update rate.

These and other embodiments, aspects, advantages, and features of the present invention will be set forth in part in the description which follows, and in part will become apparent to those skilled in the art by reference to the following description of the invention and referenced drawings or by practice of the invention. The aspects, advantages and features of the invention are realized and attained by means of the instrumentalities, procedures, and combinations particularly pointed out in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** illustrates a schematic of an electronic tracking device in accordance with an embodiment of the present invention.

FIG. **2** illustrates a location tracking system associated with the electronic tracking device and the wireless network in accordance with an embodiment of the present invention.

FIG. **3** illustrates a flow diagram to manage and control circuitry associated with the electronic tracking device of FIGS. **1** and **2** in accordance with an embodiment of the present invention.

FIG. **4** illustrates a screen display including a user definable adjustable power level monitor in accordance with an embodiment of the present invention.

FIG. **5** illustrates a location coordinate navigational system utilizing user definable power level monitor of FIG. **4** in accordance with an embodiment of the present invention.

FIG. **6** illustrates a location coordinate navigation system utilizing a user definable power level monitor of FIG. **4** in accordance with an embodiment of the present invention.

FIG. **7** illustrates a flow diagram of a user definable adjustable power level monitor in accordance with an embodiment of the present invention.

DETAILED DESCRIPTION

Reference is now made to the drawings wherein like numerals refer to like parts throughout.

As used herein, the terms "location coordinates" refer without limitation to any set or partial set of integer, real and/or complex location data or information such as longitudinal, latitudinal, and elevational positional coordinates.

As used herein, the terms "tracking device" and "electronic tracking device" refers to without limitation to any hybrid electronic circuit, integrated circuit (IC), chip, chip set, system-on-a-chip, microwave integrated circuit (MIC), Monolithic Microwave Integrated Circuit (MMIC), low noise amplifier, power amplifier, transceiver, receiver, transmitter and Application Specific Integrated Circuit (ASIC) that may be constructed and/or fabricated. The chip or IC may be constructed ("fabricated") on a small rectangle (a "die") cut from, for example, a Silicon (or special applications, Sapphire), Gallium Arsenide, or Indium Phosphide wafer. The IC may be classified, for example, into analogue, digital, or hybrid (both analogue and digital on the same chip and/or analog-to-digital converter). Digital integrated circuits may contain anything from one to millions of logic gates, invertors, and, or, nand, and nor gates, flipflops, multiplexors, etc. on a few square millimeters. The small size of these circuits allows high speed, low power dissipation, and reduced manufacturing cost compared with board-level integration.

As used herein, the terms "data transfer", "tracking and location system", "location and tracking system", "location tracking system", and "positioning system," refer to without limitation to any system that transfers and/or determines location coordinates using one or more devices, such as Global Positioning System (GPS).

As used herein, the terms "Global Positioning System" refer to without limitation to any services, methods or devices that utilize GPS technology to determine position of a GPS receiver based on measuring a signal transfer time of signals communicated between satellites having known positions and the GPS receiver. A signal transfer time is proportional to a distance of a respective satellite from the GPS receiver. The distance between a satellite and a GPS receiver may be converted, utilizing signal propagation velocity, into a respective signal transfer time. The positional information of the GPS receiver is calculated based on distance calculations from at least four satellites to determine positional information of the GPS receiver.

As used herein, the terms "wireless network", "wireless communication", "wireless link", and "wireless transmission" refers to, without limitation, any digital, analog, microwave, and millimeter wave communication networks that transfer signals from one location to another location, such as, but not limited to IEEE 802.11 g, Bluetooth, WiMax, IS-95, GSM, IS-95, CGM, CDMA, wCDMA, PDC, UMTS, TDMA, and FDMA, or combinations thereof.

Major Features

In one aspect, the present invention discloses an apparatus and method to provide an improved capability electronic tracking device. In one embodiment, the device provides electronic circuitry including an accelerometer to measure location coordinates without requiring GPS signaling. In this embodiment, location coordinates of an electronic tracking device are measured when the electronic tracking device is located in a partially enclosed structure, e.g., a building or parking lot, up to a fully enclosed structure. In one embodiment, the electronic tracking device conserves battery power when the device is partially or fully blocked access to location coordinates from one or more GPS satellites, e.g., a primary location tracking system. In yet another embodiment, accelerometer measures force applied to the electronic tracking device and provides an alert message to a guardian or other responsible person. In one embodiment, the alert message includes location coordinates of the electronic tracking device and other information, e.g., magnitude or nature of force, as well as possibility of injury of an object or individual having the electronic tracking device. As described though out the following specification, the present invention generally provides a portable electronic device configuration for locating and tracking an individual or an object.

Exemplary Apparatus

Referring now to FIGS. **1**-**2** and **4**-**6** exemplary embodiments of the electronic tracking device of the invention are described in detail. Please note that the following discussions of electronics and components for an electronic tracking device to monitor and locate individuals are non-limiting; thus, the present invention may be useful in other electronic signal transferring and communication applications, such as electronics modules included in items such as: watches, calculators, clocks, computer keyboards, computer mice, and/or mobile phones to location and track trajectory of movement and current location of these items within boundaries of or proximity to a room, building, city, state, and country.

Furthermore, it will be appreciated that while described primarily in the context of tracking individuals or objects, at least portions of the apparatus and methods described herein may be used in other applications, such as, utilized, without limitation, for control systems that monitor components such as transducers, sensors, and electrical and/or optical components that are part of an assembly line process. Moreover, it will be recognized that the present invention may find utility beyond purely tracking and monitoring concerns. Myriad of other functions will be recognized by those of ordinary skill in the art given the present disclosure.

Electronic Tracking Device

Referring to FIG. **1**, tracking device **100** contains various electronic components **101** such as transceiver **102**, signal processing circuitry **104** (e.g., a microprocessor or other signal logic circuitry), and accelerometer **130**. In one non-limiting example, the electronic components **101** are disposed, deposited, or mounted on a substrate **107** (e.g., Printed Circuit Board (PCB)). The PCB **107**, for example, may be manufactured from: polyacrylic (PA), polycarbonate (PC), composite material, and arylonitrile-butadiene-styrene (ABS) substrates, blends or combinations thereof, or the like (as described in more detail in incorporated by reference U.S. patent application Ser. No. 11/933,024 filed on Oct. 31, 2007). The signal processing circuitry **104**, in one example, associated with the tracking device **100** configured to store a

first identification code, produce a second identification code, determine location coordinates, and generate a positioning signal that contains location data (as described in more detail in incorporated by reference U.S. patent application Ser. No. 11/753,979 filed on May 25, 2007). For instance, the location data includes longitudinal, latitudinal, and elevational position of a tracking device, current address or recent address of the tracking device, a nearby landmark to the tracking device, and the like. In one example, electronic tracking device **100** is portable, mobile and fits easily within a compact volume, such as standard shirt pocket having approximate dimensions of 1.5 inch by 2.5 inch by 1.0 inch. In yet another example, electronic tracking device **100** may be one integrated circuit having dimensionality in the mm range in all directions (or even smaller).

In one embodiment, location tracking circuitry **114**, calculates location data received and sends the data to signal processing circuitry **104**. Memory **112** stores operating software and data, for instance, communicated to and from signal processing circuit **104** and/or location tracking circuitry **114**, e.g., GPS logic circuitry. In one embodiment, a signal detecting circuitry **115** detects and measures signal power level. In another embodiment, the signal processing circuitry **104** processes and measures signal power level. Battery level detection circuitry (e.g., battery level monitor **116**) detects a battery level of battery **118**, which contains one or more individual units or grouped as a single unit.

In one non-limiting example, antennas **122***a*, **122***b* electrically couple to transceiver **102**. In one variant, transceiver **102** includes one integrated circuit or, in another embodiment, may be multiple individual circuits or integrated circuits. Transceiver **102** communicates a signal including location data between tracking device **100** and the monitoring station **110**, for example, by any of the following including: wireless network, wireless data transfer station, wired telephone, and Internet channel. A demodulator circuit **126** extracts baseband signals, for instance at 100 KHz, including tracking device configuration and software updates, as well as converts a low-frequency AC signal to a DC voltage level. The DC voltage level, in one example, is supplied to battery charging circuitry **128** to recharge a battery level of the battery **118**. In one embodiment, a user of monitoring station **110**, e.g., a mobile personal digital assistant, mobile phone, or the like, by listening (or downloading) one or more advertisements to reduce and/or shift usage charges to another user, account, or database (as described in more detail in previous incorporated by reference U.S. patent application Ser. No. 11/784,400 and Ser. No. 11/784,318 each filed on Apr. 5, 2007).

In another embodiment, an accelerometer **130**, for example, a dual-axis accelerometer **130**, e.g. ADXL320 integrated circuit manufactured by Analog Devices having two substantially orthogonal beams, may be utilized. The data sheet ADXH320L from Analog Devices is incorporated by reference. In one embodiment, the accelerometer **130** activates upon one or more designated antenna(s), e.g., antennas **122***a*, **122***b*, detecting a first signal level, e.g., a low signal level or threshold value, as specified by, for instance, a user or system administrator. In one variant of this embodiment, electrical circuitry associated with GPS signal acquisition, e.g., all or a portion of amplifier block **120**, may be, for instance, placed on standby or in a sleep mode. In another embodiment, the accelerometer **130** remains in a standby mode until, for instance, a system administrator, a specified time period, or a user activates the accelerometer **130**. In one embodiment, the amplifier block **120** includes multiple electronic functions and blocks including a low noise amplifier, a

power amplifier, a RF power switch, or the like, placed in a sleep or standby mode, for instance, to converse a battery level of the battery **118**.

In another variant of this embodiment, circuitry, such as amplifier block **120** or location tracking circuitry **114**, may be placed in a sleep or standby mode to conserve a battery level of the battery **118**. In one variant, the tracking device **100** periodically checks availability of GPS signal, e.g., performs a GPS signal acquisition to determine if a receive communication signal is above a first signal level. Referring to embodiment depicted in FIG. **2**, electronic tracking device **100** exits an opening **150** in partially enclosed structure **210**; thus, electronic tracking device **100** may resume GPS signal acquisition using GPS satellite **143** (e.g., in response to a periodic check by the tracking device **100** of a receive communication signal level above a first signal level).

In one embodiment, system administrator selects a signal noise bandwidth, e.g., within a range of 3 to 500 Hz, of the accelerator **130** to measure dynamic acceleration (e.g., due to vibration forces applied to electronic tracking device **100**). In another embodiment, system administrator selects a signal noise bandwidth, e.g., within a range of 3 to 500 Hz, to measure static acceleration (due to gravitational forces applied to electronic tracking device **100**). In particular, external forces on electronic tracking device **100** cause, for example, internal structural movements, e.g., deflection of dual-axis beams, of the accelerometer **130**. The deflection of dual-axis beams generates differential voltage(s).

Differential voltage(s) are proportional to acceleration measurements, e.g., discrete acceleration measurements, of electronic tracking device **100**, for instance in x, y, and z directions. Differential voltage(s), in one instance, are relative to, for instance, a last known GPS location coordinates of electronic tracking device **100**. By performing electronic device proximity measurements, e.g., measuring acceleration vectors of electronic tracking device **100** at time intervals, e.g., T1, T2, T3 . . . TN, monitoring station **110** computes electronic tracking device velocity at time intervals, e.g., T1, T2, T3 . . . TN. In one embodiment, time intervals, e.g., T1, T2, and T3 . . . TN are measured in accordance with instructions by a system administrator or user. In one embodiment, time intervals are selected within a range of one micro-second to several minutes.

In one embodiment, the monitoring station **110** performs an integration of the acceleration measurements as a function of time to compute electronic tracking device velocity at time intervals, e.g., T1, T2, and T3 . . . TN. By referencing prior location coordinates, e.g., last known accurate location data of the electronic tracking device **100** or last known location data of nearby electronic tracking device (e.g., second tracking device **101** in proximity to electronic tracking device **100**), monitoring station **110** computes a current location of electronic tracking device **100** utilizing electronic tracking device velocity computations. Advantageously, monitoring station **110**, in an above described embodiment, uses above described device proximity measurements to monitor current location data of electronic tracking device **100** without connectivity to receive communication signals from GPS satellites.

In one embodiment, the monitoring station **110** may include a mobile phone having connectivity to wireless network **140** electrically coupled to electronic tracking device **100** (FIG. **2**). In this variant, the wireless network **140** resides or circulates within at least a portion of a semi-enclosed, partially-enclosed, or fully enclosed structure, e.g., building, parking structure, closet, storage room, or the like (e.g., structure **210** in FIG. **2**). Furthermore, in one embodiment, the

present invention conserves battery power by placing on standby, low power mode, or disabling entirely GPS signal acquisition circuitry and other associated devices, e.g., all or a portion of amplifier block **120** including power amplifiers, LNAs, switches, and the like. Furthermore, during supplemental location coordinates tracking, e.g., electronic device proximity measurements, the transceiver circuitry (e.g., transceiver **102**, location tracking circuitry **114**, and signal processing circuitry **104**) consumes reduced battery power for GPS circuitry while the electronic tracking device **100** communicates displacement vectors (e.g., differential location coordinates) to monitoring station **110** (e.g., a mobile phone, a personal digital assistant) through a wireless network **140**. As described above, when GPS signaling is not practicable, electronic device proximity measurements provide differential location coordinate information to calculate current location coordinate information.

In one embodiment, accelerometer, e.g., accelerometer **130**, determines if electronic tracking device **100** in a stationary position for a period, for instance, designated by system administrator or user. For example, electronic tracking device **100** may be, for example, located on a counter top, within a pocket of clothing, or inside a suitcase, not being moved, or not currently in use. Continuing with this embodiment, electronic tracking device **100** communicates a code, e.g., a stationary acknowledgement code, to communication network, e.g., wireless network **140**. In one variant, when or if monitoring station **110** requests location data through communication network, electronic tracking device **100** determines located in a stationary or substantially stationary position and electronic tracking device **100** communicates its last-known location to the monitoring station **110** without accessing or requiring GPS signaling or active GPS circuitry, e.g., location tracking circuitry **114**. Advantageously, in this embodiment, when electronic tracking device **100** does not utilize and require GPS circuitry, e.g., location tracking circuitry **114**, or functionality, the power resources are preserved of battery **118** in contrast to many conventional GPS communication system continuing power-on GPS circuitry. In one embodiment, electronic tracking device **130** associated with a person or object remains at a substantially stationary position approximately one-forth to one-third of a calendar day; thus, this feature of not accessing GPS circuitry preserves battery power.

In another embodiment, an accelerometer, such as accelerometer **130**, detects tapping against electronic tracking device **100**. For instance, upon wake-up, user prompt, system administrator prompt, or active, accelerometer **130** detects a person or object tapping a sequence on electronic tracking device **100**. In one embodiment, electronic tracking device **100** includes digital signal programming circuitry (such as of signal processing circuitry **104**). The digital signal programming circuitry recognizes programmed motions received by accelerometer, such as accelerometer **130**, and transmits an alert message to the monitoring station **110** upon receiving a recognized motion pattern. For example, electronic tracking device **100** may be programmed to recognize an "SOS tap cadence". Thus, if electronic tracking device **100** is repeatedly tapped, for instance, in a "dot-dot-dot, dash-dash-dash, dot-dot-dot" pattern, signal processing circuitry **104** recognizes a motion pattern and transmit an alert message to wireless network **114** to monitoring station **110**. In one instance, alert message may be associated as a distress pattern and will require an appropriate response. In one variant, the accelerometer may recognize when an object or individual spins or turns motion of electronic tracking device **100**. Continuing with this embodiment, signal processing circuitry **104** recognizes programmed motions, and transceiver **102** transmits an alert message to wireless network **114** associated with programmed motions. In another variant, electronic tracking device **100** is programmed to recognize other motion patterns, such as, when it is tumbled or flipped. Depending upon on duration, time, or cadence of these movements or motion patterns, electronic tracking device **100** communicates an alert message to the wireless network **114**. In one variant, wireless network **114** performs an appropriate action, such as communicating information signal to monitoring station **110**.

In another example, physical impacts on electronic tracking device **100** are measured to determine if an individual or object may be injured. In one embodiment, magnitude of displacement vectors may be measured by one or more accelerometers, such as accelerometer **130**, disposed at various inclinations and orientations, e.g., disposed substantially orthogonal to one another. Continuing with this embodiment, when a measured physical impact is above a predetermined level, an object or individual associated with electronic tracking device **100** may have suffered a fall or be in need of medical attention. In one variant of this embodiment, a user (e.g., a system administrator, or person located in a contact book) at monitoring station **110** becomes alerted, e.g., by text message, email, or voice mail (as more fully described in previously incorporated by reference U.S. patent application Ser. No. 11/935,901 filed on Nov. 6, 2007, entitled "System and Method for Creating and Managing a Personalized Web Interface for Monitoring Location Information on Individuals and Objects Using Tracking Devices"). In one variant of this embodiment, if a user does not affirmatively respond, another individual, guardian, medical personnel, or law enforcement officer is contacted by monitoring station **110** (as more fully described in Ser. No. 11/935,901). In yet another variant of this embodiment, monitoring station **110** continues to contact individuals until the alert message is affirmatively answered.

Battery Conservation

Referring to FIG. **3**, a flow chart **300** illustrates battery conservation for electronic tracking device **100** as described in FIGS. **1**, **2** in accordance with one embodiment of the present invention. In step **302**, antenna **122*a*** associated with electronic tracking device **100** acquires a snapshot of receive communication signal including location coordinates data. In step **304**, processing unit **104** processes the snapshot of receive communication signal including location coordinates data. In step **306**, processing unit **104** determines a power level of receive communication signal. In step **308**, accelerometer **130** activates if a power level of the receive communication signal is insufficient for processing. In one variant of step **308**, accelerometer **130** measures acceleration of electronic tracking device **100** at time intervals, e.g., T1, T2, T3 . . . TN.

In step **310**, processing unit **104** computes current location coordinates using acceleration measurements. In step **312**, all or a portion of amplifier block **120** and associated circuitry, e.g., location tracking circuitry, are activated at selected time intervals to determine if receive communication signal is of sufficient signal strength. In one variation of step **312**, upon determining receive communication signal of sufficient signal strength, location tracking circuitry **114** are activated, and processing unit **104** determines location coordinates from the receive communication signal. In another variation of step **312**, upon determining receive communication signal of sufficient signal strength, accelerometer **130** is deactivated and location tracking circuitry **114** are activated, and processing unit **104** determines location coordinates from the receive communication signal.

User Adjustable Location Coordinate Refresh Rate

Referring to FIG. **4**, screen display **400** illustrates a user definable adjustable location coordinate refresh rate in one embodiment of the present invention. As best illustrated in FIG. **5**, schematic **500** illustrates communication of location coordinate refresh rate between portable electronic tracking device **402** and satellite navigation system **403** in accordance with an embodiment of the present invention.

In one embodiment, portable electronic tracking device **402** monitors location coordinates of one or more individuals and objects using satellite navigation system **403**. Portable electronic tracking device **402** includes battery **118** having battery charge level **406** displayed on screen display **400** of personal communication device **404** (e.g., mobile phone, wireless digital assistant, laptop computer, personal computer and the like). Other components of portable electronic tracking device **402** include transceiver **102**, signal processing circuitry **104**, battery level monitor **116**, signal processing circuitry **104**, location tracking circuitry **114**, adj **416**, and battery charging circuitry **128**.

In one example, battery level monitor **116** measures in real-time battery charge level **406**. In one embodiment, battery level monitor **116** predicts, for instance, estimated remaining battery charge life **414** in response to battery charge level **406**. This estimation or prediction may be based on standard techniques know by those skilled in the art at the time of this disclosure including measurement of time average amperage draw and voltage level (over a given period) to estimate remaining battery charge life **414**.

In one embodiment, local battery power adjustment mechanism **416** generates in substantially real-time updated set of network communication signaling protocols. In one variant, updated set of network communication signaling protocols communicated, for instance, includes an update rate (e.g., refresh rate) of location coordinate packets **446**. In one example, update rate of location coordinate packets **446** includes request rate **420** of location coordinate packets **422** by target host **452** (e.g., a computer server) and/or listen rate **425** of location coordinate packets **422** by portable electronic tracking device **402**. Updated set of network communication signaling protocols, for instance, has value (e.g., X Y Z) responsive to user input request **430**.

In one embodiment, to conserve battery power when communicating messages between target host **452** and portable electronic tracking device **402**, local battery power adjustment mechanism **416**, for instance, remotely by personal communication device **404** communicates a message to active or deactivate a portion of transceiver circuitry **102** or processor circuitry **104** or location tracking circuitry **114** to conserve battery charge level **406** responsive to value **419** (e.g., a user input screen control or mouse adjustable cursor value). In one variant, local battery adjustment mechanism **416** includes user adjustable screen icon **432** to graphically display in substantially real-time trade-off relationships between remaining battery charge level **414** and update rate **446** (e.g., refresh rate) of location coordinate packets **422**. Advantageously as compared to conventional tracking devices, user input request **430** adjusts value **419** to select an appropriate update set of network communication signaling protocols to achieve a desired user defined battery operating environment, e.g., obtain optimal battery life, obtain optimal update rate, tradeoffs between them. In one embodiment, when user adjusts slider **432** to value **419**, a message is sent to target host **452**, which communicates an updated set of network communication to portable location tracking device **402**.

In response to receipt of updated set of network communication signaling protocols, portable location tracking device **402** adjusts settings (an internal time schedule) and acknowledges receipt of the message to target host **452**. Portable location tracking device **402** checks internal time schedule to determine if it should listen for (perform a location lookup of) location coordinates **422** from satellite navigation system **403** or an adjacent portable location coordinate tracking device (as shown in FIG. **6**) as more fully described in, for instance, U.S. patent application Ser. No. 11/753,979 filed on May 25, 2007, which has been previously incorporated by referenced and claimed priority to. Portable location tracking device **402** obtains location coordinates **422** and stores, for instance, in one or more internal breadcrumb memory location(s). Based on the internal time schedule, portable location tracking device **402** determines whether to transmit contents of the one or more breadcrumb memory location(s) to target host **452**.

Upon transmission of contents, target host **452** acknowledges receipt of contents of one or more breadcrumb memory locations. In one variant, target host **452** issues a command to flush one or more breadcrumb memory locations. In this same variant, portable electronic tracking device **402** flushes its internal breadcrumb memory and acknowledges completion of the command to the target host **452**. In another variant, target host **452** issues a stack pointer adjustment command to acknowledge receipt of previously submitted contents of breadcrumb memory locations and to move stack pointer to an adjacent or an alternative breadcrumb memory location to signal that these memory location have been uploaded by target host **452**.

In another embodiment, local battery adjustment mechanism **416** includes timing adjustment mechanism **446** adjusting, for instance, request rate **420** of location coordinate packets **422** to target host **452** and listen rate **425** of location coordinates **422** in accordance with a current location coordinate position of portable tracking device **402**. In one variant, local battery adjustment mechanism **416** includes user adjustable electronic display **432** that indicates current level of battery **406** and allows user a capability to adjust power level thereof. In one variant of this embodiment, local battery adjustment mechanism **416** includes automatic or semi-automatic sleep mode **448**. In one embodiment, automatic or semi-automatic sleep mode **448** sets to a minimal level request rate **420** of location coordinate packets **422** to target host **452** and listen rate **425** of location coordinates **422** until battery power monitor **116** measures, for instance, a sustainable battery charge level to sustain operation of portable electronic tracking device **402**.

In one embodiment, local battery adjustment mechanism **416** includes charge control management (e.g., adj **416**) of portable electronic tracking device **402** that estimates charge capability (e.g., battery charge remaining **414**) and adjusts cycling of one or more of request rate **420** of location coordinate packets **422** to target host **452** and listen rate **425** of location coordinate packets **422** to maximize charge capability. In one alternative embodiment, local battery adjustment mechanism (e.g., adj **416**) includes cycle management apparatus **416** to set up, for example, timing schedule (e.g., refresh rate **446**) to maximize effectiveness of request rate **420** and listen rate **425** in response to substantially real-time measured velocity of travel of portable electronic tracking device **402**.

Referring to FIGS. **5** and **6**, system **500** and system **600** respectively include local charging management device (e.g. local battery adjustment mechanism **416**) manages electrical resource capability for an electronic tracking device **402** that is tracked by at least one other tracking device (e.g., devices

403, **405**, **407**, **409**). In one embodiment, tracking device (e.g., portable electronic tracking device **402**) includes a battery level monitor **116** remotely located for charging unit (e.g., battery charging circuitry **128**), adj **416** (e.g., electrical power resource management component, local battery adjustment mechanism **416**). In one variant, electrical power resource management component adjusts cycle timing of request rate **420** of location coordinate packets **422** to target host **452** and listen rate **425** of location coordinate packets **422** from satellite navigation system **403** responsive to estimated charge level of charging unit (e.g., battery charge level **406**).

In one embodiment, electrical power resource management component (e.g., local battery adjustment mechanism **416**) includes a substantially real-time user viewable display icon **432** that indicates estimate charge level (e.g., battery level **406**) and provides an on-line user adjustable cursor display **432** (see FIG. **4**). In one example, on-line cursor display **432** adjusts one or more of: request rate **420** of location coordinate packets **422** to target host **452** and listen rate **425** and gives substantially automatic updated estimated charge level of the charging unit (e.g., battery charging circuitry or unit **128**). In one variant, local battery management device **416** includes charge control management of electronic tracking device **402** that estimates charge capability and adjust cycling of request rate **420** of location coordinate packets **422** to host target **428** and listen rate **425** of location coordinate packets **422** from satellite navigation system **403** or alternatively an adjacent portable location tracking device to maximize charge capability.

In yet another embodiment, local charging management device **416** includes cycle management apparatus to set up timing schedule **446** to maximize effectiveness of request rate **420** and listen rate **425** in response to measured velocity of travel portable electronic tracking device **402**. In one variant, local charging management device **416** electrically coupled through personal communication device **404** sets up timing schedule **446** between one or more than one wireless communication networks to communicate information between portable electronic tracking device **402**. In one example of this embodiment, listen rate **425** of location coordinate packets **422** to the host target **428** and response rate **425** includes global positioning system (GPS) system refresh rate **446**.

Advantageously as compared to prior global positioning systems having manufactured defined power settings, the current invention power charging monitor (e.g., battery level monitor **116**) measures a power level (e.g., battery power level **406**) of the power charging unit (e.g., battery level monitor **116**) and substantially automatically adjusts power usage responsive to available power of power charging unit to maximize power life.

In yet another advantage, the present invention power charging monitor (e.g., battery level monitor **116**) measures a power level (e.g., battery power level **406**) of power charging unit (e.g., battery **118**) and adjusts a power level (e.g., battery power level **406**) applied to, for example, location tracking circuitry (e.g., location tracking circuitry **114**) or transceiver **102** responsive to one or more signal levels. In contrast to previous manufacturer tracking device power level settings, the present invention has the capability of power level (e.g., battery power level **406**) adjustments include multitude of threshold values (see active display **432** of FIG. **4**) that is determined by user or system administrator to intermittently activate or deactivate location tracking circuitry (e.g., location tracking circuitry **114**) to conserve power of the power charging unit (e.g., battery **118**) responsive to estimated charge level (e.g., battery charge level **406**).

In a first example, a lost dog has portable location tracking device **402**. Using the present invention, a user, e.g., a dog owner, will adjust a slider level, such as using on-line cursor display **432**, to a high update rate interval. For instance, the high setting corresponds to 15 minute intervals for location and 15 minute intervals for transmission to target host, e.g., server. The server sends these settings to portable location tracking device **402** and portable location tracking device **402** adjusts its settings and acknowledges the message. As such, portable location tracking device **402** will perform frequent updates of its location coordinates from a satellite navigation system and will transmit frequently its location coordinates to a target host. Thus, advantageously, with this setting, a user will probably more rapidly locate a missing or lost pet. With this setting, battery life will be relatively short.

In a second example, a teenager borrows a parent's car having portable location tracking device **402**. Using the present invention, users, e.g., parents, desire to know if their teenager is driving safely in designated areas or locations, but does not want to track the teenager's location in real-time. In this case, the parents adjust a slider level, such as using on-line cursor display **432**, to a medium update rate interval. For instance, the medium setting corresponds to 15 minute intervals for location and 60 minute intervals for transmission to the target host, e.g., server. The server sends these settings to portable location tracking device **402** and portable location tracking device **402** adjusts its settings and acknowledges the message. As such, portable location tracking device **402** will perform frequent updates of its velocity and location coordinates from a satellite navigation system and will less frequently transmit its location coordinates to a target host. As long as the teenager remains in allowed areas and traveling at allowed speeds, the portable location tracking device will not transmit frequently. Fortunately, during these infrequent transmissions, portable location tracking device will transmit its location history. Thus, advantageously, with this setting, parents can see history at many locations while still preserving battery life, e.g., longer life than first example.

In a third example, a provider of construction equipment having portable tracking device **402** rents the equipment to contractors. Using the present invention, a user, e.g., provider desires to know location of the equipment once per day. In this case, the provider adjusts a slider level, such as using on-line cursor display **432**, to a low update rate interval. For instance, the low setting corresponds to 1440 minute intervals (24 hours) for location coordinates and 1440 minute intervals (24 hours) for transmission to the target host, e.g., server. The server sends these settings to portable location tracking device **402** and portable location tracking device **402** adjusts its settings and acknowledges the message. As such, portable location tracking device **402** will perform infrequent updates (once per day) of location coordinates from a satellite navigation system and will less frequently transmission (once per day) of its location coordinates to a target host. Thus, advantageously, with this setting, portable location coordinate device will realize increased battery life, e.g., longer life than first and second examples.

User Adjustable Power Level Monitor Flow Chart

Referring to FIG. **7**, flow chart **700** illustrates user definable adjustable conservation power level monitor for portable electronic tracking device **402** as described in FIGS. **4**, **5**, and **6** in accordance with one embodiment of the present invention.

In step **702**, user receives measured charging unit power level of tracking device **402** communicated by a location coordinate tracking system **403**. In step **704**, system administrator, user, automatic or semi-automatic program software

adjusts charging unit power level of tracking device **402** in response to a substantially-real life estimate of the unit power level **406** of a charge unit **118** of tracking device **402**.

In step **706**, system administrator, user, automatic or semi-automatic power monitoring software program creates an initial timing schedule **446** including communication of signaling parameters associated with a request rate **420** communicated with location coordinate information **422** and listen rate **425** of location coordinate information **422**. In one variant of step **706**, initial timing schedule **446** was at least partially automatically and responsive to an estimated power level **414** of the charge unit **118**.

In step **708**, user readjusts the initial timing schedule **446** for communication of signaling parameters in accordance with a local request by remote user using an Internet accessible icon **432** that displays user viewable tradeoffs between the estimated charge unit life and charge unit update rate. In one variant of step **708**, remote user uses a mouse to enter an on screen cursor value **419** that is associated with a tradeoff of estimated charge life **414** and an update rate **446** of location coordinate information **422**.

It is noted that many variations of the methods described above may be utilized consistently with the present invention. Specifically, certain steps are optional and may be performed or deleted as desired. Similarly, other steps (such as additional data sampling, processing, filtration, calibration, or mathematical analysis for example) may be added to the foregoing embodiments. Additionally, the order of performance of certain steps may be permuted, or performed in parallel (or series) if desired. Hence, the foregoing embodiments are merely illustrative of the broader methods of the invention disclosed herein.

While the above detailed description has shown, described, and pointed out novel features of the invention as applied to various embodiments, it will be understood that various omissions, substitutions and changes in the form and details of the device or process illustrated may be made by those skilled in the art without departing from the spirit of the invention. The foregoing description is of the best mode presently contemplated of carrying out the invention. This description is in no way meant to be limiting, but rather should be taken as illustrative of the general principles of the invention. The scope of the invention should be determined with reference to the claims.

What is claimed is:

1. A portable electronic tracking device to monitor location coordinates of one or more individuals and objects using a satellite navigation system, the portable electronic tracking device comprising:

a battery having a battery charge level;

transceiver circuitry;

processor circuitry;

a battery power monitor to measure in real-time the battery charge level and to make a prediction of an estimated remaining battery charge level in response to the battery charge level;

local battery power adjustment mechanism to generate in substantially real-time an updated set of network communication signaling protocols associated with at least one of a request rate of location coordinate packets to be communicated to a target host and a listen rate of the location coordinate packets from a satellite navigation system, the updated set of network communication signaling protocols having a value that is responsive to a user input request;

wherein the local battery power adjustment mechanism actives or deactivates at least one portion of the transceiver circuitry or the processor circuitry to conserve the battery charge level in response to the value.

2. The device of claim **1**, wherein the local battery power adjustment mechanism comprises an adjustable screen icon to graphically display in substantially real-time a trade-off relationship between the remaining battery charge level and an update rate of the location coordinate packets that is in response to the updated set of network communication signaling protocols.

3. The device of claim **1**, wherein the local battery power adjustment mechanism comprises a timing adjustment mechanism that adjusts the at least one of the request rate of the location coordinate packets to the target host and the listen rate of the location coordinates from a satellite navigation system in accordance with a current position of the tracking device.

4. The device of claim **1**, wherein the local battery power adjustment mechanism comprises a user adjustable electronic display that indicates a current level of battery power and allows a user a capability to adjust power level thereof.

5. The device of claim **4**, wherein the local battery power adjustment mechanism comprises an automatic sleep mode to set at least one of the request rate of the location coordinate packets to the target host and the listen rate of the location coordinates from the satellite navigation system to a minimal level until the battery power monitor measures a sustainable battery charge level to process the at least one portion of an receive signal.

6. The device of claim **4**, wherein the local battery power adjustment mechanism comprises a charge control management of the portable electronic tracking device that estimates charge capability and adjusts cycling of the at least one of a request rate of location coordinate packets to a target host and a listen rate of the location coordinate packets from the satellite navigation system to maximize charge capability.

7. The device of claim **1**, wherein the local battery power adjustment mechanism comprises a cycle management apparatus to set up a timing schedule to maximize effectiveness of the request rate and the listen rate in response to a substantially real-time measured velocity of the portable electronic tracking device.

8. A local charging management device to manage electrical resource capability for an electronic tracking device that is tracked by at least one other tracking device comprising:

a battery power level monitor;

a charging unit; and

an electrical power resource management component to adjust cycle timing of at least one of a request rate of location coordinate packets to a target host and a listen rate of the location coordinate packets responsive to an estimated charge level of the charging unit,

wherein the battery power level monitor measures a power level of the charging unit and adjusts a power level applied to location tracking circuitry responsive to one or more signal levels, the power level comprising a multitude of threshold values determined by a user or system administrator to intermittently activate or deactivate the location tracking circuitry to conserve power of the charging unit in response to the estimated charge level of the charging unit.

9. The apparatus of claim **8**, wherein the electrical power resource management component comprises a substantially real-time user viewable display icon that indicates the estimated charge level and provides an on-line user adjustable cursor display that adjusts at least one of the request rate of the location coordinate packets to the target host and the listen

rate of the location coordinate packets and gives substantially automatic updated estimated charge level of the charging unit.

10. The apparatus of claim **8**, wherein the local charging management device comprises a charge control management of the portable electronic tracking device that estimates charge capability and adjusts cycling of the at least one of a request rate of location coordinate packets to a host target and a listen rate of the location coordinate packets to maximize charge capability.

11. The apparatus of claim **8**, wherein the local charging management device comprises a cycle management apparatus to set up a timing schedule to maximize effectiveness of the request rate and listen rate responsive to measured velocity of the portable electronic tracking device.

12. The apparatus of claim **11**, wherein the local charging management device electrically couples to a mobile phone to remote control the local apparatus to setup a timing schedule from a multitude of wireless communication networks to communicate information between the electronic tracking device and the mobile phone.

13. The apparatus of claim **8**, wherein the listen rate of the location coordinates comprises a global positioning system (GPS) system refresh rate of the location coordinates.

14. The apparatus of claim **8**, wherein the request rate and the listen rate are set remotely by a user using a mobile phone or wireless communication device.

15. The apparatus of claim **8**, wherein the battery power level monitor measures a power level of the charging unit and substantially automatically adjusts power usage responsive to available power of the charging unit to maximize power unit life.

16. A method to control power usage comprising:

measuring charging unit power level of a tracking device communicated by a location coordinate tracking system;

adjusting charging unit power level of the tracking device in response to a substantially-real life estimate of a unit power level of a charge unit of the tracking device;

creating an initial timing schedule for communication of signaling parameters associated with a target host request rate communicated with location coordinate information and listen rate of the location coordinate information, the initial time schedule being at least partially automatically and responsive to an estimated power level of the charge unit; and

readjusting the initial timing schedule for communication of signaling parameters in accordance with a local request by a remote user using an Internet accessible icon that displays user viewable tradeoffs between an estimated charge unit life and a charge unit update rate.

17. The method of claim **16**, wherein creating an initial timing schedule for communication of signaling parameters comprises creating a management schedule for setting a rate at which messages are exchanged between the tracking device and a target host.

18. The method of claim **16**, wherein creating an initial timing schedule for communication of signaling parameters comprises creating a management schedule for setting a rate at which messages are exchanged between a navigational satellite system and the tracking device to a local device to maximize effectiveness of the request rate and the listen rate to the location coordinate information in response to a measured velocity of the tracking device.

19. The method of claim **16**, wherein readjusting the timing schedule for communication of signaling parameters in accordance with a local request by a remote user comprise electrically coupling the tracking device to a mobile phone to remote control cycling the location coordinates to setup up a timing schedule between a multitude of wireless communication networks to communicate information between the electronic tracking device and the mobile phone.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner

v.

LBT IP I LLC,
Patent Owner

Inter Partes Review Case No. IPR2020-01189
U.S. Patent No. 8,497,774

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 8,497,774

I. INTRODUCTION

Petitioner Apple Inc. requests *Inter Partes* Review of Claims 1, 4, 5, 6, 8, 10, 13, and 15 (collectively, the "Challenged Claims") of USPN 8,497,774 assigned to LBT IP I LLC. '774 Patent (Ex. 1001). The purportedly distinguishing feature of the Challenged Claims—an electronic tracking device adjusting an update rate responsive to user input and/or a battery power level—was well-known before the priority date of the '774 Patent, and the Challenged Claims are obvious over the prior art as detailed herein. Accordingly, IPR of the Challenged Claims should be instituted.

II. SUMMARY OF THE '774 PATENT

A. Description of the '774 Patent

The '774 Patent describes devices and a method to increase the lifetime of a portable electronic tracking device, such as a GPS receiver. '774 Patent, Abstract. The electronic tracking devices discussed in the '774 Patent and claimed in the Challenged Claims allow the user to select between modes with higher update rates but short battery lives, and modes with lower update rates but longer battery lives. '774 Patent, FIG. 4, 14:1–57. The battery savings are realized by deactivating the GPS receiver and/or processor. '774 Patent, 11:44–53. The tracking device may also intermittently deactivate the GPS receiver in response to a detected low battery level in order to extend the device's operating life. '774 Patent, 13:52–67.

B. Summary of Unpatentability of the Challenged Claims

Sakamoto teaches a GPS positioning system including a portable terminal having a GPS receiver for determining a position of the terminal, and a remote server to which the position information can be transmitted. *Sakamoto* (Ex. 1004), Abstract, [0018], [0030]–[0031]. Like the ’774 Patent, *Sakamoto* recognizes the tradeoff between keeping the GPS receiver powered to continually update the current position and saving battery power by powering off the GPS receiver. *Sakamoto,* [0003]. *Sakamoto* thus allows the user to select between “high sensitivity positioning mode” (where the GPS receiver is continuously powered on) and “normal sensitivity positioning mode” (where the GPS receiver is only intermittently powered on). *Sakamoto,* [0026]; [0043]. *Sakamoto* can also automatically switch from the high-sensitivity positioning mode (which updates the location information more frequently and consumes more battery power) to the normal sensitivity positioning mode (or even a power-off mode) upon detecting the remaining battery charge has fallen below a user-specified threshold. *Sakamoto*, [0029], [0039]. *Sakamoto* thus teaches the allegedly inventive concept of the ’774 Patent, that of allowing a user to choose an update rate while also being able to fall back to a lower power mode to conserve battery power.

contentions, the ability to evaluate the overlap between issues raised in the petition and the litigation is at a nascent stage. (*Fintiv* Factor 4). At the least, there is likely going to be no complete overlap between the asserted and challenged claims, as this Petition challenges more and different claims than asserted in the Complaint. (Ex. 1036, *LBT Complaint*). The Petition also presents a strong showing of unpatentability. (*Fintiv* Factor 6). These factors favor not exercising discretionary denial under § 314(a).

IV. REQUIREMENTS FOR IPR UNDER 37 C.F.R. § 42.104

A. Grounds for Standing Under 37 C.F.R. § 42.104(a)

Apple certifies the ’774 Patent is available for IPR and Apple is not barred or estopped from requesting IPR challenging the claims of the ’774 Patent. Apple is <u>not</u> the owner of the ’774 Patent, has <u>not</u> filed a civil action challenging the validity of any claim of the ’774 Patent, and this Petition is not filed more than one year after Apple was served with a complaint alleging infringement of the ’774 Patent.

B. Identification of Challenged Under 37 C.F.R. 42.104(b) and Relief Requested

In view of the prior art and evidence presented, the Challenged Claims of the ’774 Patent are unpatentable and should be cancelled. 37 C.F.R. § 42.104(b)(1). Based on the prior art references identified below, IPR of the Challenged Claims should be granted. 37 C.F.R. § 42.104(b)(2).

Proposed Grounds of Unpatentability	
Ground 1:	*Sakamoto* renders claims 1, 4, 5, 6, 8, 10, 13, and 15 obvious under 35 U.S.C. § 103
Ground 2:	*Sakamoto* in view of Applicant Admitted Prior Art renders claims 1, 4, 5, 6, 8, 10, 13, and 15 obvious under 35 U.S.C. § 103
Ground 2:	*Sakamoto* in view of *Hayasaka* renders claims 1, 4, 5, 6, 8, 10, 13, and 15 obvious under 35 U.S.C. § 103

Sections VI–VIII identify where each element of the Challenged Claims is found in the prior art. 37 C.F.R. § 42.104(b)(4). The exhibit numbers of the supporting evidence relied upon to support the challenges are provided above and the relevance of the evidence to the challenges raised are provided in Sections V–VIII. 37 C.F.R. § 42.104(b)(5). Exhibits 1001–1044 are also attached.

C. Claim Construction Under 37 C.F.R. § 42.104(b)(3)

Patent Owner has submitted a Complaint in a co-pending litigation, but has not provided detailed infringement contentions. In view of Patent Owner's apparent contentions and the prior art and evidence provided herein, no claim terms require express construction to resolve the grounds presented. Where appropriate, Petitioner provides support for the meaning of claim terms in its analysis of how the prior art renders the challenged claims obvious, as detailed below.

V. SHOWING OF ANALOGOUS PRIOR ART

Sakamoto and *Hayasaka* were neither cited nor considered during the prosecution of the '774 Patent. The earliest claimed priority date for the '774 Patent is April 5, 2007.

A. *Sakamoto* Is Analogous Prior Art

Sakamoto published February 5, 2004, and therefore qualifies as prior art to the '774 Patent under at least 35 U.S.C. § 102(b) (Pre-AIA). *Sakamoto* teaches a GPS positioning system including at least one position information communication terminal (terminal) having a GPS receiver. *Sakamoto*, Abstract, [0018]. *Sakamoto* recognizes keeping a GPS receiver always operating produces a "highly sensitive positioning operation," but, particularly when applied to portable devices with limited battery capacity, this mode must be judiciously applied to extend battery lifetime. *Sakamoto,* [0003]. *Sakamoto* thus discloses techniques to "flexibly control the operation mode of the GPS receiver" and only "selectively use the highly sensitive positioning operation." *Id*.

Because *Sakamoto*, like the '774 Patent, discloses a battery-powered portable electronic tracking device employing a GPS receiver and manages power consumption by deactivating the GPS receiver when the battery power is low, *Sakamoto* is in the same field of endeavor and is pertinent to a problem to be solved

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,

Petitioner

v.

LBT IP I LLC,

Patent Owner

Case IPR2020-01189
U.S. Patent No. 8,497,774

PATENT OWNER'S PRELIMINARY RESPONSE TO PETITION FOR *INTER PARTES* REVIEW OF U.S. PAT. NO. 8,497,774

III. CONCLUSION

For the reasons set forth above, Petitioner has not demonstrated a reasonable likelihood of success on its obviousness argument for any claim in the ’774 Patent. Accordingly, the petition should be denied.

Respectfully submitted,

BUTZEL LONG, PC

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

LBT IP I LLC,
Patent Owner.

IPR2020-01189
Patent 8,497,774 B2

Before JOHN A. HUDALLA, SHEILA F. McSHANE, and JULIET MITCHELL DIRBA, *Administrative Patent Judges*.

HUDALLA, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

Apple Inc. ("Petitioner") filed a Petition (Paper 1, "Pet.") requesting an *inter partes* review of claims 1, 4–6, 8, 10, 13, and 15 ("the challenged claims") of U.S. Patent No. 8,497,774 B2 (Ex. 1001, "the '774 patent"). Petitioner filed a Declaration of Scott Andrews (Ex. 1003) with its Petition. Patent Owner, LBT IP I LLC ("Patent Owner"), filed a Preliminary Response (Paper 8, "Prelim. Resp.").

We have authority to determine whether to institute an *inter partes* review. *See* 35 U.S.C. § 314 (2018); 37 C.F.R. § 42.4(a) (2019). Under 35 U.S.C. § 314(a), we may not authorize an *inter partes* review unless the information in the petition and the preliminary response "shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." For the reasons that follow, we institute an *inter partes* review as to claims 1, 4–6, 8, 10, 13, and 15 of the '774 patent on all grounds of unpatentability presented.

I. BACKGROUND

A. Real Parties-in-Interest

Petitioner identifies Apple Inc. as the real party-in-interest. Pet. 72. Patent Owner identifies LBT IP I LLC as the real party-in-interest. Paper 3, 2; Paper 6, 2.

B. Related Proceedings

The parties identify the following proceedings related to the '774 patent (Pet. 72; Paper 3, 2; Paper 6, 2):

LBT IP I LLC v. Apple Inc., No. 1:19-cv-01245-UNA (D. Del. filed July 1, 2019); and

IPR2020-01190, IPR2020-01191, IPR2020-01192, and IPR2020-01193, in which Petitioner challenges other patents owned by Patent Owner. We institute *inter partes* reviews in IPR2020-01190, IPR2020-01191, IPR2020-01192, and IPR2020-01193 in decisions issued concurrently herewith.

C. *The '774 patent*

The '774 patent is directed to location and tracking communication systems. Ex. 1001, 1:33–34. Figure 1 of the '774 patent is reproduced below.

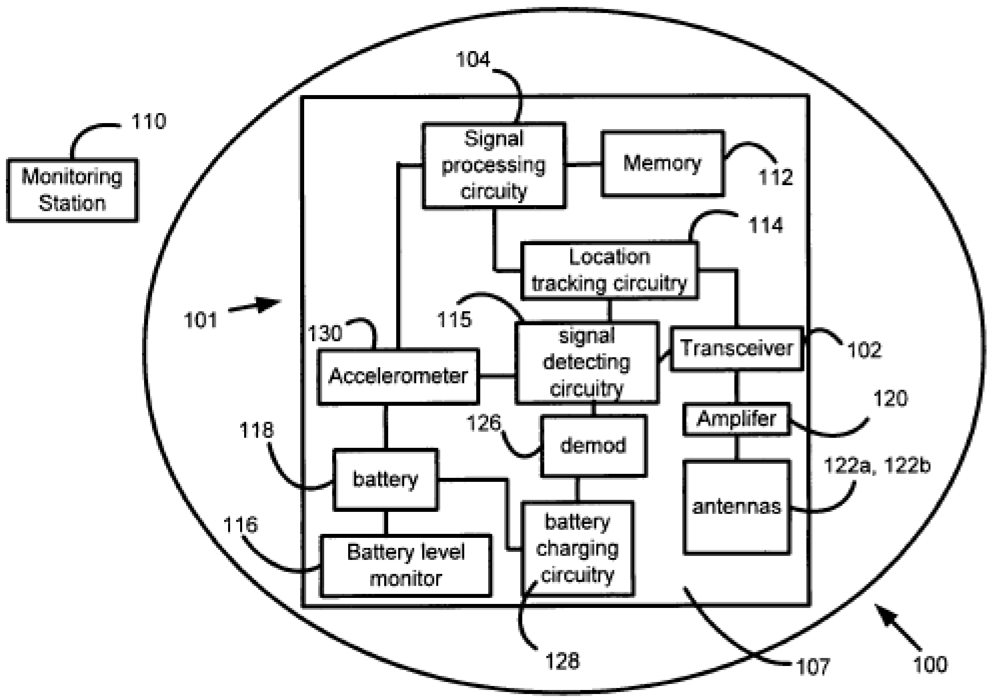

Figure 1

Figure 1 depicts a schematic of tracking device 100, which contains electronic components 101 such as transceiver 102, signal processing circuitry 104 (e.g., a microprocessor or other signal logic circuitry), and accelerometer 130. *Id.* at 4:62–64, 6:54–57. Location tracking circuitry 114 (e.g., global positioning system (GPS) circuitry) calculates location data received and sends the data to signal processing circuitry 104. *Id.* at 7:17–19. Signal detecting circuitry 115 detects and measures signal power level. *Id.* at 7:22–23. Battery level monitor 116 detects a battery level of battery 118. *Id.* at 7:25–28.

Tracking device 100 periodically checks availability of a GPS signal by performing a GPS signal acquisition to determine if a receive communication signal is above a first signal level. *Id.* at 8:7–10. Location tracking circuitry 114 or transceiver 102 may be placed in a sleep or standby mode to conserve a battery level of battery 118. *Id.* at 8:4–8. Electronic tracking device 100 may resume GPS signal acquisition using GPS satellites when the acquired receive communication signal level is above the first signal level. *Id.* at 8:10–16.

Accelerometer 130 may also activate if a power level of the receive communication signal (e.g., GPS signal) is insufficient for processing. *Id.* at 10:47–49. In this case, processing unit 104 computes current location coordinates using acceleration measurements. *Id.* at 10:53–54. When the receive communication signal again becomes sufficient for processing, accelerometer 130 is deactivated and location tracking circuitry 114 is activated. *Id.* at 10:58–67. In this case, processing unit 104 resumes the calculation of location coordinates from the receive communication signal. *Id.*

Figure 4 of the ’774 patent is reproduced below.

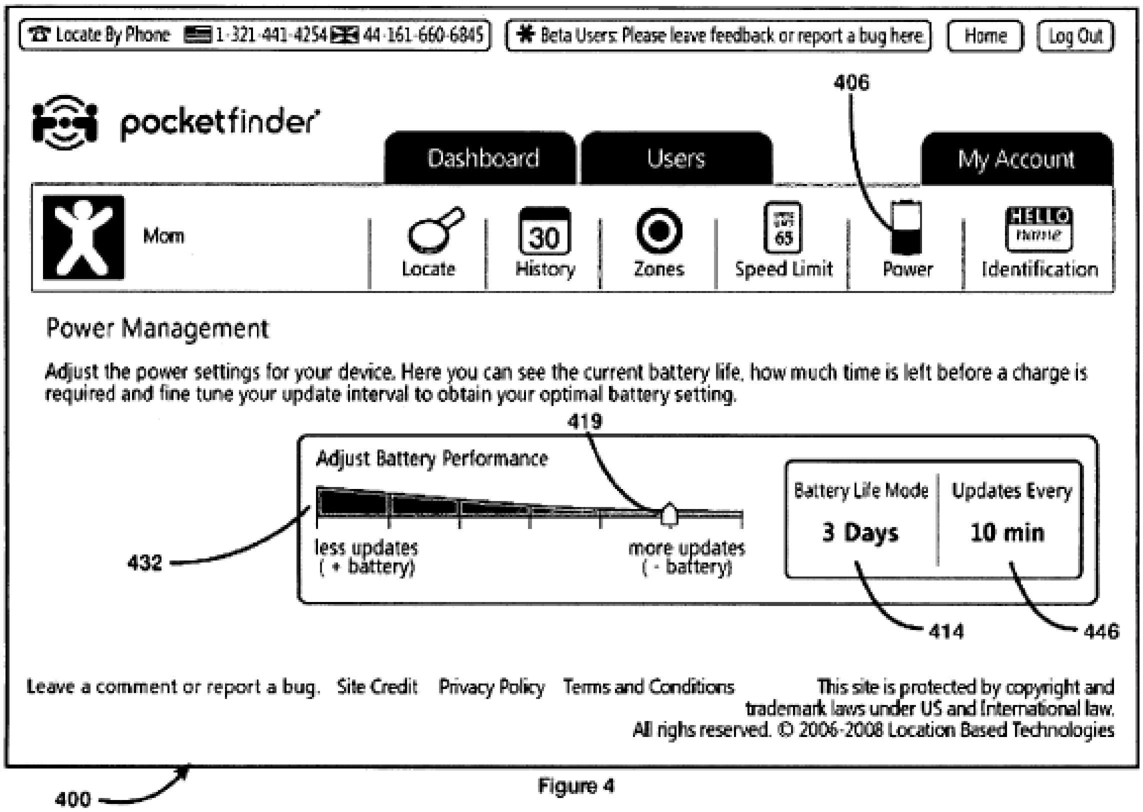

Figure 4

Figure 4 depicts screen display 400 of a personal communication device including a user definable adjustable power level monitor for an electronic tracking device. *Id.* at 5:5–7, 11:2–4, 11:12–17. Battery level monitor 116 measures in real-time battery charge level 406 of battery 118 and predicts estimated remaining battery charge life 414 in response to battery charge level 406. *Id.* at 11:22–25, 13:52–58. Battery level monitor 116 also adjusts the power level applied to location tracking circuitry 114 or transceiver 102 responsive to one or more signal levels. *Id.* at 13:52–58.

A local battery power adjustment mechanism generates in substantially real-time an updated set of network communication signaling protocols including, for example, update rate 446 (e.g., refresh rate) of location coordinate packets. *Id.* at 11:31–36. Update rate 446 consists of a

request rate of location coordinate packets by the target host and/or a listen rate of location coordinate packets by the portable electronic tracking device. *Id.* at 11:36–41. The local battery power adjustment mechanism includes user-adjustable slider 432[1] to graphically display in substantially real-time the trade-off relationships between remaining battery charge level 414 and update rate 446 of location coordinate packets. *Id.* at 11:53–57. The user may select a multitude of threshold values via slider 432 to intermittently activate or deactivate location tracking circuitry 114 in order to conserve the power of battery 118. *Id.* at 13:58–67. For example, the user may adjust slider 432 to choose a range of values between a lower update rate 446 (and less battery usage) and a higher update rate 446 (and more battery usage). *Id.* at 11:53–57, Fig. 4. This results in "an appropriate update[d] set of network communication signaling protocols to achieve a desired user defined battery operating environment, e.g., obtain optimal battery life, obtain optimal update rate, [and the] tradeoffs between them." *Id.* at 11:58–63. This further may result in the local battery power adjustment mechanism communicating a message to activate or deactivate a portion of the transceiver circuitry, processor circuitry, or location tracking circuitry. *Id.* at 11:44–53.

The '774 patent issued from an application filed on April 7, 2009, which was a continuation-in-part of six other applications; the earliest filing date among these six other applications is April 5, 2007. Ex. 1001, codes (22), (63). As discussed below, Petitioner applies the April 5, 2007,

[1] Slider 432 is also called "user adjustable screen icon 432," "on-line user adjustable cursor display 432," and "active display 432" in the specification of the '774 patent. *See, e.g.*, Ex. 1001, 11:53–57, 13:13–18, 13:58–67.

filing date of the earliest application (i.e., the earliest possible effective filing date) for qualifying the asserted references as prior art. *See* Pet. 3, 7–8.

D. Illustrative Claim

Of the challenged claims of the ’774 patent, claims 1 and 8 are independent. Claims 4–6 depend directly or indirectly from claim 1, and claims 10, 13, and 15 depend from claim 8. Claim 1 is illustrative of the challenged claims and recites:

> 1. A portable electronic tracking device to monitor location coordinates of one or more individuals and objects using a satellite navigation system, the portable electronic tracking device comprising:
>
> a battery having a battery charge level;
>
> transceiver circuitry;
>
> processor circuitry;
>
> a battery power monitor to measure in real-time the battery charge level and to make a prediction of an estimated remaining battery charge level in response to the battery charge level;
>
> local battery power adjustment mechanism to generate in substantially real-time an updated set of network communication signaling protocols associated with at least one of a request rate of location coordinate packets to be communicated to a target host and a listen rate of the location coordinate packets from a satellite navigation system, the updated set of network communication signaling protocols having a value that is responsive to a user input request;
>
> wherein the local battery power adjustment mechanism actives or deactivates at least one portion of the transceiver

> circuitry or the processor circuitry to conserve the battery charge level in response to the value.

Ex. 1001, 15:46–16:2.

E. Prior Art

Petitioner relies on the following prior art:

> Japanese Unexamined Patent Application Publication No. JP 2004-37116A, published Feb. 5, 2004 (Ex. 1004, "Sakamoto");
>
> Applicants' Admitted Prior Art (Ex. 1001, 11:22–30, "AAPA"); and
>
> U.S. Patent No. 5,845,142, filed Aug. 29, 1997, issued Dec. 1, 1998 (Ex. 1011, "Hayasaka").

F. The Asserted Grounds

Petitioner challenges claims 1, 4–6, 8, 10, 13, and 15 of the '774 patent on the following grounds (Pet. 6):

Claims Challenged	**35 U.S.C. §**	**References**
1, 4–6, 8, 10, 13, 15	103(a)[2]	Sakamoto
1, 4–6, 8, 10, 13, 15	103(a)	Sakamoto, AAPA
1, 4–6, 8, 10, 13, 15	103(a)	Sakamoto, Hayasaka

II. ANALYSIS

We now consider Petitioner's asserted grounds and Patent Owner's arguments in the Preliminary Response to determine whether Petitioner has

[2] The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102 and 103. Because the '774 patent was filed before March 16, 2013 (the effective date of the relevant amendments), the pre-AIA versions of §§ 102 and 103 apply.

met the "reasonable likelihood" standard for institution under 35 U.S.C. § 314(a).

A. Legal Standards

A claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, so-called secondary considerations. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). We also recognize that prior art references must be "considered together with the knowledge of one of ordinary skill in the pertinent art." *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994) (citing *In re Samour*, 571 F.2d 559, 562 (CCPA 1978)).

B. Level of Ordinary Skill in the Art

Citing testimony from Mr. Andrews, Petitioner contends a person of ordinary skill in the art (or "POSITA") "would have had a bachelor's degree in Electrical Engineering, Computer Engineering, Computer Science, or an equivalent degree, with at least two years of experience in GPS navigation, portable tracking devices, or related technologies." Pet. 3 (citing Ex. 1003

¶¶ 29–30). Patent Owner does not dispute Petitioner's definition of the level of ordinary skill at this time.

For purposes of this Decision, we adopt Petitioner's definition of the level of ordinary skill in the art without the qualifier "at least," which introduces ambiguity. On the present record, we are satisfied that this definition comports with the level of skill necessary to understand and implement the teachings of the '774 patent and the asserted prior art.

C. Claim Interpretation

In an *inter partes* review, we construe each claim "in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent." 37 C.F.R. § 42.100(b). Accordingly, our claim construction standard is the same as that of a district court. *See id.* Under the standard applied by district courts, claim terms are generally given their plain and ordinary meaning as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc). "There are only two exceptions to this general rule: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution." *Thorner v. Sony Comput. Entm't Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012).

Neither party puts forth any terms for construction. *See* Pet. 6. Nonetheless, Patent Owner makes arguments relative to the term "multitude" in the recited "multitude of threshold values" of claim 8. *See*

Prelim. Resp. 15–17. In addition, Petitioner's Sakamoto–AAPA and Sakamoto–Hayasaka grounds turn on an alternate interpretation of the limitation "make a prediction of an estimated remaining battery charge level" in claim 1 and similar limitations in other claims. Pet. 57, 61. We address these claim construction issues in turn.

1. "Multitude"

Patent Owner contends that Petitioner's showing of two threshold values in the prior art does not represent a "multitude" in the recited "multitude of threshold values" of claim 8. Prelim. Resp. 16–17. In support of its interpretation, Patent Owner cites the reference to a "multitude of threshold values" in the specification of the '774 patent, which is linked to "active display 432 in Fig. 4." *Id.* (citing Ex. 1001, 13:61–62, Fig. 4). Patent Owner contends active display 432 (i.e., slider 432) in Figure 4 of the '774 patent "includes between five and seven thresholds, depending on whether one includes the endpoints as thresholds." *Id.* Patent Owner also cites a dictionary definition for multitude as being "a great number." *Id.* at 16.

Although Patent Owner is correct that the exemplary embodiment in Figure 4 of the '774 patent depicts 5–7 thresholds (*see* Ex. 1001, Fig. 4 (432)), "we do not read limitations from the embodiments in the specification into the claims." *Hill-Rom Servs., Inc. v. Stryker Corp.*, 755 F.3d 1367, 1371 (Fed. Cir. 2014) (citing *Liebel–Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 904 (Fed. Cir. 2004)). As such, we do not view 5 or 7 as a benchmark for what constitutes a "multitude" in claim 8. And, although certain contemporaneous dictionary definitions of "multitude"

include "very great number" and "large number" (*see*, *e.g.*, Ex. 3001, 3; Ex. 3002, 3), we do not view these definitions as excluding two from what constitutes a "multitude." We note, for example, that the word "plurality" also is defined in these same dictionaries as a "large number" and that one dictionary even defines "plurality" as "a multitude." *See, e.g.*, Ex. 3001, 4; Ex. 3002, 4. And, in patent law, "plurality" is universally construed to mean "at least two." *See SIMO Holdings Inc. v. Hong Kong uCloudlink Network Tech. Ltd.*, 983 F.3d 1367, 1377 (Fed. Cir. 2021). Thus, for purposes of this Decision, we construe "multitude" to include two. We encourage the parties to address the interpretation of this claim limitation during trial if they do not agree with our interpretation.

2. *"Make a Prediction of an Estimated Remaining Battery Charge Level"*

In the Sakamoto–AAPA and Sakamoto–Hayasaka grounds (*see infra* §§ II.E, II.F), Petitioner cites AAPA or Hayasaka for teaching the recited "battery power monitor" of claim 1

> [t]o the extent that Patent Owner contends that *Sakamoto* does not teach predicting an estimated remaining battery charge level in response to the battery charge level, or contends that "predicting an estimated remaining battery charge level in response to the battery charge level" (as claimed) requires predicting an estimated remaining battery charge *life*.

Pet. 57, 61. Patent Owner does not take a position on this interpretation in its Preliminary Response.[3]

[3] Patent Owner does argue, however, that Petitioner's proposed combinations with the AAPA and Hayasaka are impermissible because they are redundant of Petitioner's Sakamoto ground, which relies on Sakamoto alone for teaching the recited "battery power monitor." *See* Prelim.

We now consider whether the "make a prediction of an estimated remaining battery charge level" requires making a prediction of remaining battery charge *life*. By way of explanation, Mr. Andrews testifies that predicted remaining charge level might be expressed a percentage of battery remaining (e.g., 18%), whereas predicted remaining charge life might be expressed an amount of battery time remaining (e.g., one hour). Ex. 1003 ¶ 114. We note that the plain language of claim 1 requires predicting remaining charge *level* in response to the battery charge level. As such, the plain language of the claim does not require a prediction of battery life. Moreover, we are not persuaded that a person of ordinary skill in the art would have understood the claim language to require a prediction of battery life. On the present record, we see no justification to rewrite the claim language. *See Chef Am., Inc. v. Lamb-Weston, Inc.*, 358 F.3d 1371, 1373–74 (Fed. Cir. 2004) (determining that plain language of claim applies, even when yielding a nonsensical result, because "courts may not redraft claims"); *cf. Eidos Display, LLC v. AU Optronics Corp.*, 779 F.3d 1360, 1367–68 (Fed. Cir. 2015) ("Determining how a person of ordinary skill in the art would understand the limitation, however, is different from rewriting the limitation.").

Thus, we determine at this juncture that the limitation "make a prediction of an estimated remaining battery charge level" in claim 1 (and

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Resp. 6–7. Although we do not fully analyze these alternative grounds below (*see infra* §§ II.E, II.F), we do not agree with Patent Owner that Petitioner's proposed combinations are improper simply because the references being combined teach similar components and functionality. Rather, the propriety of these combinations—and any combination—turns on the rationale for combining the references.

similar limitations in other claims) does not require making a prediction of remaining battery charge *life*. Again, we encourage the parties to address the interpretation of this claim limitation during trial if they do not agree with our interpretation.

3. *Other Terms*

We determine that no other terms require explicit construction. *See, e.g.*, *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) ("[W]e need only construe terms 'that are in controversy, and only to the extent necessary to resolve the controversy' . . . ." (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

D. *Obviousness Ground Based on Sakamoto*

Petitioner contends the subject matter of claims 1, 4–6, 8, 10, 13, and 15 would have been obvious over Sakamoto. Pet. 8–55. Patent Owner disputes Petitioner's contentions. Prelim. Resp. 8–17.

1. *Sakamoto*

Sakamoto is a Japanese patent application publication directed to the use of a GPS positioning system that includes a portable terminal and remote server. Ex. 1004, code (57), ¶ 18. Figure 1, reproduced below, is a diagram showing a position information communication terminal.

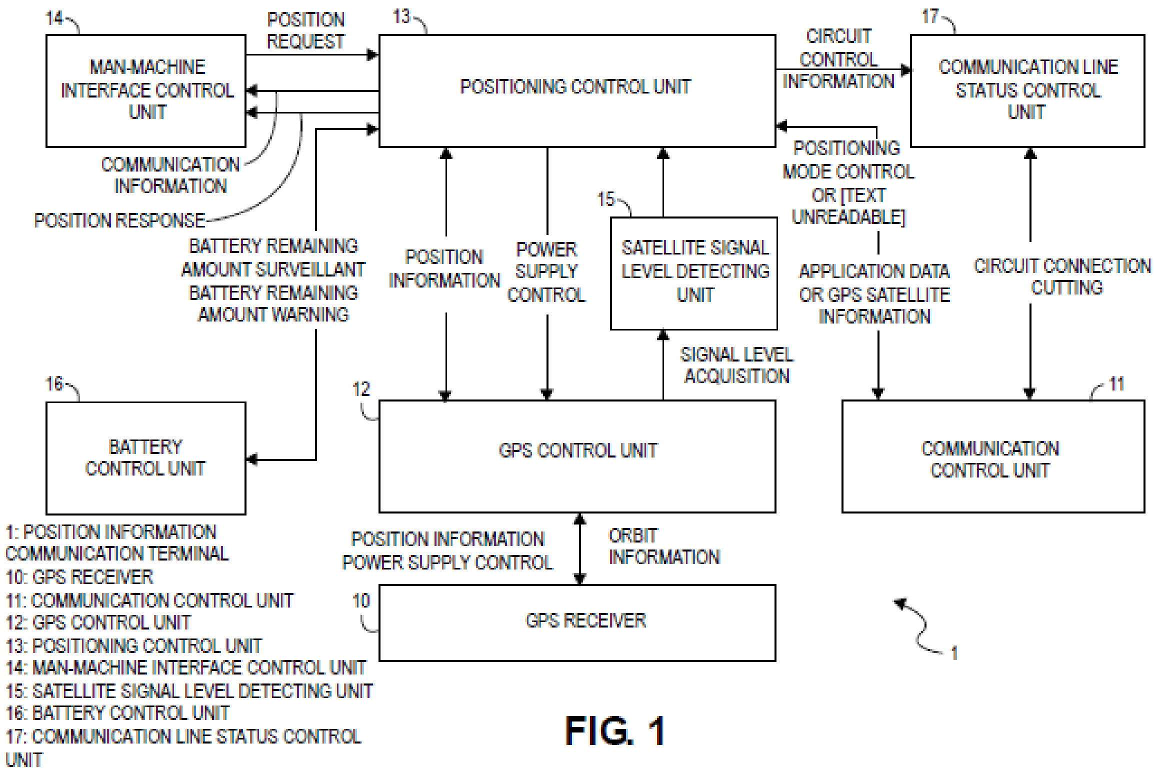

FIG. 1

Figure 1, above, depicts position information communication terminal 1, which includes GPS receiver 10, communication control unit 11 for mobile communications, GPS control unit 12, positioning control unit 13, man-machine interface control unit 14, satellite signal level detection unit 15, battery control unit 16, and communication line status control unit 17. *Id.* ¶ 19. Battery control unit 16 constantly monitors the remaining battery level. *Id.* ¶ 28. Battery control unit 16 provides positioning control unit 13 a remaining battery life warning when the remaining battery amount falls below a preset threshold value. *Id.* ¶ 19.

Satellite signal level detector 15 detects a level of the GPS signal received by GPS receiver 10 via GPS control unit 12. *Id.* When the signal level value is equal to or higher than a predetermined threshold value, positioning mode control unit 22 initiates a normal sensitivity positioning mode. *Id.* ¶ 38. Normal sensitivity positioning mode is a mode in which the

GPS receiver is operated only when necessary. *Id.* ¶¶ 4–5, 19. When the signal level value is equal to or lower than a predetermined threshold value, positioning mode control unit 22 initiates a high sensitivity positioning mode. *Id.* ¶ 38. High sensitivity positioning mode is a mode in which the GPS receiver is operated constantly. *Id.* ¶¶ 4–5, 19. When the signal level value is equal to or lower than a threshold value associated with the inability to perform positioning, positioning mode control unit 22 stops the position search. *Id.* ¶ 38. A user may select among normal sensitivity positioning mode, high sensitivity positioning mode, and the power-off of terminal 1 via man-machine interface control unit 14. *Id.* ¶¶ 26, 28.

Petitioner contends Sakamoto qualifies as prior art under 35 U.S.C. § 102(b) based on its publication date. Pet. 7. Patent Owner does not contest the prior art status of Sakamoto. For purposes of this Decision, we determine that Sakamoto qualifies as prior art under 35 U.S.C. § 102(b) because Sakamoto's publication date of February 5, 2004, is more than one year before the earliest effective filing date of the challenged claims, which is April 5, 2007. Ex. 1001, code (63); Ex. 1004, code (43).

2. Claim 1

The preamble of claim 1 recites "[a] portable electronic tracking device to monitor location coordinates of one or more individuals and objects using a satellite navigation system." Ex. 1001, 15:46–48. Petitioner cites Sakamoto's position information communication terminal 1, which comprises GPS receiver 10, communication control unit 11, GPS control unit 12, position control unit 13, man-machine interface control unit 14, satellite signal level detecting unit 15, battery control unit 16 and battery,

and communication line status controlling unit 17. Pet. 13 (citing Ex. 1004 ¶ 19, Fig. 1). Petitioner contends an ordinarily skilled artisan would have considered terminal 1 to be portable based on Sakamoto's teaching of using terminal 1 with a battery and a mobile communication network. *Id.* at 14–15 (citing Ex. 1003 ¶ 76; Ex. 1004 ¶¶ 3, 11, 14, 30, 31, 46). Regarding "monitor[ing] location coordinates of . . . individuals and objects using a satellite navigation system," Petitioner cites Sakamoto's GPS receiver 10 and GPS control unit 12, which allegedly "determine terminal user A's (an individual's) and terminal 1's (an object's) position." *Id.* at 15 (citing Ex. 1004 ¶¶ 18, 20–24, Fig. 2).

Patent Owner does not contest Petitioner's analysis of the preamble at this time. Neither party addresses whether the preamble is limiting. Because Petitioner has shown that Sakamoto teaches the preamble, we need not determine whether the preamble is limiting. *See Nidec*, 868 F.3d at 1017.

Claim 1 further recites "a battery having a battery charge level." Ex. 1001, 15:50. Petitioner cites Sakamoto's teachings of battery control unit 16 in terminal 1 that notifies "positioning control unit 13 of a remaining battery amount warning when the remaining amount value of a battery (not shown) that supplies operating power falls below a preset threshold value." Pet. 16 (quoting Ex. 1004 ¶ 19) (emphasis omitted). Petitioner also notes Sakamoto's reference that battery control unit 16 monitors "remaining battery level." *Id.* at 17 (quoting Ex. 1004 ¶ 28) (emphasis omitted). At this stage, Patent Owner does not contest Petitioner's analysis of this limitation. Based on the present record, we are persuaded that Sakamoto teaches "a battery with a battery charge level." *See, e.g.*, Ex. 1004 ¶¶ 19, 28.

Claim 1 further recites "transceiver circuitry." Ex. 1001, 15:51. Petitioner cites, *inter alia*, Sakamoto's teaching of "communication control unit 11" including "mobile communication means." Pet. 18 (citing Ex. 1004 ¶¶ 19, 30). Petitioner further cites Sakamoto's teachings that communications control unit 11 transmits positioning control messages and remaining battery amount warning messages and receives positioning control messages. *Id.* (citing Ex. 1004 ¶¶ 7, 34, 35). In light of these teachings, Petitioner contends an ordinarily skilled artisan would have known Sakamoto's communication control unit 11 to be a transceiver. *Id.* (citing Ex. 1003 ¶ 80). At this stage, Patent Owner does not contest Petitioner's analysis of this limitation. Based on the present record, we are persuaded that Sakamoto teaches transceiver circuitry. *See, e.g.*, Ex. 1003 ¶ 80; Ex. 1004 ¶¶ 7, 34, 35.

Claim 1 further recites "processor circuitry." Ex. 1001, 15:52. Petitioner cites Sakamoto's teaching of GPS receiver 10 performing "positioning operations" when it determines location coordinates from a received communication signal. Pet. 20 (citing Ex. 1004 ¶ 19, Fig. 1). Petitioner further cites Sakamoto's teaching of satellite level detecting unit 15 detecting the level of the GPS satellite signal and performing calculations based on the received signal level. *Id.* at 21 (citing Ex. 1003 ¶ 83; Ex. 1004 ¶¶ 19, 37). At this stage, Patent Owner does not contest Petitioner's analysis of this limitation. Based on the present record, we are persuaded that Sakamoto teaches processor circuitry. *See, e.g.*, Ex. 1004 ¶¶ 19, 37.

Claim 1 further recites "a battery power monitor to measure in real-time the battery charge level and to make a prediction of an estimated

remaining battery charge level in response to the battery charge level." Ex. 1001, 15:53–56. Petitioner again cites Sakamoto's battery control unit 16 and notes that it "constantly" monitors a remaining battery amount in order to determine when battery power falls below a predetermined threshold. Pet. 22–24 (citing Ex. 1004 ¶¶ 19, 28, 39). Petitioner further contends an ordinarily skilled artisan would have known that monitoring the remaining battery charge amount necessarily requires an estimate based on "conditions such as temperature and battery age." *Id.* at 24–25 (citing Ex. 1003 ¶ 85). At this stage, Patent Owner does not contest Petitioner's analysis of this limitation. Based on the present record, we are persuaded that Sakamoto's battery control unit 16 teaches the recited "battery power monitor." *See, e.g.*, Ex. 1003 ¶ 85; Ex. 1004 ¶¶ 19, 28, 39.

Claim 1 further recites:

> local battery power adjustment mechanism to generate in substantially real-time an updated set of network communication signaling protocols associated with at least one of a request rate of location coordinate packets to be communicated to a target host and a listen rate of the location coordinate packets from a satellite navigation system, the updated set of network communication signaling protocols having a value that is responsive to a user input request.

Ex. 1001, 15:57–65. For the recited "local battery power adjustment mechanism," Petitioner cites Sakamoto's man-machine interface control unit 14 and positioning control unit 13. Pet. 26–27 (citing Ex. 1004, Fig. 1). Petitioner contends these elements "act in concert to reduce (*i.e.,* 'adjust') the battery usage of *Sakamoto's* terminal." *Id.* at 27 (citing Ex. 1004 ¶ 46). Petitioner explains that a user sets a "preset threshold value" using man-machine interface control unit 14 "to specify the battery level below which the terminal will automatically switch from high sensitivity positioning

mode to normal sensitivity positioning mode." *Id.* at 27–28 (citing Ex. 1004 ¶¶ 29, 46). Based on this threshold value, positioning control unit 13 switches between the high sensitivity positioning mode and the normal sensitivity positioning mode by turning on and off the GPS receiver according to the current positioning mode. *Id.* at 28 (citing Ex. 1003 ¶ 87; Ex. 1004 ¶¶ 20, 24). Petitioner contends modes are changed "substantially [in] real-time" based on Sakamoto's real-time battery monitoring and Sakamoto's teaching of "automatically" switching modes at a preset threshold battery level. *Id.* at 29–30 (citing Ex. 1003 ¶ 88; Ex. 1004 ¶¶ 19, 29, 46).

Petitioner maps the recited "communication signal protocols" to Sakamoto's normal sensitivity positioning mode, high sensitivity positioning mode, and power-off mode. Pet. 31 (citing Ex. 1004 ¶¶ 5–10, 28). As discussed below, Petitioner focuses on the listen rate for each of these modes.[4] For example, Petitioner notes that, after an initial position request, "high-sensitivity positioning mode keeps the GPS continuously powered on, 'constantly' updating the position of the terminal," so an ordinarily skilled artisan would have known the GPS receiver to have "an associated refresh rate of location coordinates (commonly 1Hz)." *Id.* (citing Ex. 1003 ¶ 90; Ex. 1004 ¶¶ 20, 25, 31, 36). Petitioner further notes that, in normal sensitivity positioning mode, GPS receiver 10 is powered on and off in response to requests at man-machine interface control unit 14, which Petitioner characterizes as regular or irregular. *Id.* at 32–33 (citing Ex. 1003

[4] We note that the recited "request rate" and "listen rate" in this limitation are alternatives based on the language "at least one of," so we focus on the "listen rate."

¶ 92; Ex. 1004 ¶¶ 24, 34). Petitioner additionally notes that Sakamoto discloses search requests made during a regular "short cycle." *Id.* at 33 (citing, *inter alia*, Ex. 1004 ¶ 40). Furthermore, Petitioner notes that even when no positioning request is pending, the server may periodically (i.e., at a "cycle set in advance") send a satellite signal level request message, which "causes the terminal to monitor the satellite signal level for a specified length of time and send a 'satellite signal level response message' with signal strength data to the server." *Id.* at 32 (citing Ex. 1004 ¶ 37). As such, Petitioner contends an ordinarily skilled artisan would have understood that the periodic satellite signal request message cycle is "a minimum value for the listen rate of the GPS receiver in normal sensitivity position." *Id.* (citing Ex. 1003 ¶ 92). Finally, Petitioner asserts that the listen rate for GPS signals is zero when the GPS receiver is in power-off mode. *Id.* at 33–34 (citing Ex. 1003 ¶ 94; Ex. 1004 ¶¶ 28, 39, 51).

For the limitation that "the updated set of network communication signaling protocols hav[e] a value that is responsive to a user input request," Petitioner cites Sakamoto's teaching that "terminal user A can select the positioning mode (and therefore the value of the communication signaling protocol) using man-machine interface control unit 14." Pet. 34–35 (citing Ex. 1004 ¶ 26). Petitioner contends the "value of the communication signaling protocol" is responsive to the user's selection of either normal sensitivity positioning mode, high sensitivity positioning mode, or power-off mode. *Id.* at 35 (citing Ex. 1004 ¶ 28).

Patent Owner argues the "local battery power adjustment mechanism" limitation of claim 1 "is directed to updating a schedule of repeating events." Prelim. Resp. 12. In support of its argument, Patent Owner cites

embodiments of the ’774 patent where “the request rate of location coordinate packets to be communicated to a target host and the listen rate of the location coordinate packets from a satellite navigation system represent a schedule for when repeating activity(ies) [sic] occur.” *Id.* at 10–11 (citing Ex. 1001, 12:1–18); *see also id.* at 11–12 (citing examples from the ’774 patent related to request rate and listen rate schedules for tracking a dog, a car, and rented construction equipment). Patent Owner contrasts the cited teachings from Sakamoto because they “do[] not disclose a schedule of repeating events or any updating of such schedule.” *Id.* at 12–13.

We do not agree with Patent Owner’s arguments because they are not commensurate with the language of claim 1. In particular, claim 1 includes no requirement that the “updated set of network communication signaling protocols” must relate to schedules of repeating events or the updating of such schedules. “While we read claims in view of the specification, of which they are a part, we do not read limitations from the embodiments in the specification into the claims.” *Hill-Rom*, 755 F.3d at 1371. Thus, Patent Owner is wrong to suggest (*see* Prelim. Resp. 10–12) that the exemplary embodiments it cites from the specification of the ’774 patent limit the recited “local battery power adjustment mechanism.”

On the present record, we are persuaded that Sakamoto’s normal sensitivity positioning mode, high sensitivity positioning mode, and power-off mode teach an “updated set of network communication signaling protocols.” *See, e.g.*, Ex. 1004 ¶¶ 5–10, 28. Petitioner also shows that Sakamoto either teaches, or an ordinarily skilled artisan would have appreciated from Sakamoto, that each of these modes has associated “listen rate[s] of the location coordinate packets from a satellite navigation system.”

See, e.g., Ex. 1003 ¶¶ 90–92, 94; Ex. 1004 ¶¶ 20, 24, 25, 28, 31, 34, 36, 37, 39, 40, 51. The user can select a preset threshold battery level using man-machine interface control unit 14, which controls in real-time how positioning control unit 13 switches between modes (i.e., "responsive to a user input request"). *See, e.g.*, Ex. 1003 ¶¶ 87–88; Ex. 1004 ¶¶ 19, 20, 24, 29, 46. Thus, we are persuaded that Sakamoto's man-machine interface control unit 14 and positioning control unit 13 act together as a "local battery power adjustment mechanism" that generates Sakamoto's various modes. *See, e.g.*, Ex. 1004, ¶ 46, Fig. 1.

Claim 1 further recites "wherein the local battery power adjustment mechanism actives or deactivates at least one portion of the transceiver circuitry or the processor circuitry to conserve the battery charge level in response to the value." Ex. 1001, 15:66–16:2. Petitioner cites Sakamoto's teaching that positioning control unit 13 (a part of the recited "local battery power adjustment mechanism") activates and deactivates GPS receiver 10 (a portion of the recited "transceiver circuitry" and "processor circuity") via GPS control unit 12. Pet. 36–37 (citing Ex. 1004 ¶¶ 19, 20, 24, 25, 29, 36). According to Petitioner, "the purpose of deactivating GPS receiver (and reactivating it only on demand) is to conserve battery charge level." *Id.* at 37–38 (citing Ex. 1003 ¶ 95; Ex. 1004 ¶ 39). At this stage, Patent Owner does not contest Petitioner's analysis of this limitation. Based on the present record, we are persuaded that Sakamoto's positioning control unit 13 activating and deactivating GPS receiver 10 via GPS control unit 12 teaches this limitation. *See, e.g.*, Ex. 1003 ¶ 95; Ex. 1004 ¶¶ 19, 20, 24, 25, 29, 36, 39.

Petitioner has persuasively shown that Sakamoto teaches all limitations of claim 1 in light of the knowledge of a person of ordinary skill in the art. Based on the present record, we determine that Petitioner has established a reasonable likelihood that it would prevail in showing that the subject matter of claim 1 would have been obvious over Sakamoto.

3. Claims 4–6

We have reviewed Petitioner's analysis for claims 4–6. Pet. 38–44. Patent Owner relies on the same arguments discussed above with respect to claim 1. *See* Prelim. Resp. 13. Based on the present record, Petitioner has established a reasonable likelihood that it would prevail in showing that the subject matter of claims 4–6 would have been obvious over Sakamoto.

4. Claim 8

Claim 8 recites "[a] local charging management device to manage electrical resource capability for an electronic tracking device that is tracked by at least one other tracking device." Ex. 1001, 16:43–45. Petitioner's analysis for claim 8 is similar to that of claim 1. *See* Pet. 44–54. We now focus on limitations whose analysis is disputed by Patent Owner.

Claim 8 recites "an electrical power resource management component to adjust cycle timing of at least one of a request rate of location coordinate packets to a target host and a listen rate of the location coordinate packets responsive to an estimated charge level of the charging unit." Ex. 1001, 16:48–52. Petitioner cites its analysis from claim 1 related to switching positioning modes for teaching "adjust[ing] cycle timing." *See* Pet. 46–47. Patent Owner disputes this analysis for the same reason as with respect to

claim 1: that Sakamoto's positioning modes do not disclose a schedule of repeating events or any updating of such schedule. *See* Prelim. Resp. 13–15. Again, however, claim 8 does not require any such schedule, and we decline to read in a schedule requirements from the exemplary embodiments of the '774 patent. Thus, we do not agree with Patent Owner's argument.

Claim 8 further recites

> wherein the battery power level monitor measures a power level of the charging unit and adjusts a power level applied to location tracking circuitry responsive to one or more signal levels, the power level comprising a multitude of threshold values determined by a user or system administrator to intermittently activate or deactivate the location tracking circuitry to conserve power of the charging unit in response to the estimated charge level of the charging unit.

Ex. 1001, 16:53–61. For the recited "multitude of threshold values," Petitioner cites Sakamoto's teachings of two thresholds related to (1) the user-defined battery power level threshold below which the mode switches from high sensitivity positioning mode to normal sensitivity positioning mode; and (2) a "still-lower power mode associated with shutting off the GPS receiver completely." Pet. 50–51 (citing Ex. 1004 ¶¶ 29, 39, 51). Regarding the "still-lower power mode," Petitioner contends an ordinarily skilled artisan "would have understood these teachings of *Sakamoto* to indicate a second battery threshold below which this complete GPS power off occurs." *Id.* at 51 (citing Ex. 1003 ¶ 103).

Patent Owner argues that Petitioner's two cited thresholds from Sakamoto cannot teach the recited "multitude of threshold values." Prelim. Resp. 16–17. Patent Owner bases its argument on (1) an Internet dictionary definition of "multitude" being "a great number"; and (2) the embodiment in the '774 patent that utilizes 5–7 thresholds. *Id.* Nevertheless, as discussed

above, we interpret the word "multitude" to include two for purposes of this Decision. *See supra* § II.C. Thus, Petitioner's two cited thresholds from Sakamoto are sufficient to teach the recited "multitude of threshold values" under this interpretation. *See, e.g.*, Ex. 1003 ¶ 103; Ex. 1004 ¶¶ 29, 39, 51.

Based on the present record, and for the reasons discussed above and with respect to claim 1, we determine that Petitioner has established a reasonable likelihood that it would prevail in showing that the subject matter of claim 8 would have been obvious over Sakamoto.

5. Claims 10, 13, and 15

We have reviewed Petitioner's analysis for claims 10, 13, and 15. Pet. 54–55. Patent Owner relies on the same arguments discussed above with respect to claim 8. *See* Prelim. Resp. 15, 17. Based on the present record, Petitioner has established a reasonable likelihood that it would prevail in showing that the subject matter of claims 10, 13, and 15 would have been obvious over Sakamoto.

E. Obviousness Ground Based on Sakamoto and AAPA

Petitioner contends the subject matter of claims 1, 4–6, 8, 10, 13, and 15 would have been obvious over the combination of Sakamoto and AAPA. Pet. 56–60. Patent Owner disputes Petitioner's contentions. Prelim. Resp. 4–7. Because we have already determined that Petitioner has established a reasonable likelihood of success with respect to the obviousness ground based on Sakamoto alone, we will be instituting on all challenged claims and all challenged grounds in the Petition. *See SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348 (2018) (holding that the Board may not

institute review on fewer than all claims challenged in the petition); Patent Trial and Appeal Board Consolidated Trial Practice Guide 5–6 (Nov. 2019) ("Consolidated Trial Practice Guide"), available at https://www.uspto.gov/sites/default/files/documents/tpgnov.pdf (stating that, in light of *SAS*, the Board will "institute as to all claims challenged in the petition and on all grounds in the petition" when it institutes a trial). Nevertheless, we include the following discussion regarding the Sakamoto–AAPA ground.

Building on its contentions for the Sakamoto obviousness ground, Petitioner cites the AAPA for teaching the limitation "make a prediction of an estimated remaining battery charge level" in claim 1 (and a similar "estimated charge level" limitation in claim 8). Pet. 57 (citing Ex. 1001, 11:23–30), 60. Petitioner contends an ordinarily skilled artisan would have been aware of the "standard techniques" to predict a remaining battery charge life. *Id.* at 57 (citing Ex. 1003 ¶ 114). Although the AAPA appears to show that techniques for predicting remaining battery charge life were known in the art at the time of the invention (*see* Ex. 1001, 11:23–30), we determine above (*see supra* § II.C.2) that "predicting an estimated remaining battery charge level" in claim 1 does not require a prediction of estimated remaining battery charge *life*. Because we have determined above that Sakamoto teaches predicting estimated remaining battery charge level (*see supra* § II.D), we need not further address this ground at this time.

F. Obviousness Ground Based on Sakamoto and Hayasaka

Petitioner contends the subject matter of claims 1, 4–6, 8, 10, 13, and 15 would have been obvious over Sakamoto and Hayasaka. Pet. 60–71. Patent Owner disputes Petitioner's contentions. Prelim. Resp. 4–7.

We include the following discussion even though we will be instituting on all challenged claims and all grounds in the Petition. Similar to the Sakamoto–AAPA ground discussed above, Petitioner cites a different secondary reference, Hayasaka, for teaching the recited "battery power monitor" of claim 1 to the extent that it must predict an estimated remaining battery charge *life*. Pet. 61; *see also id.* at 70 (citing same teaching for similar limitation in claim 8). Nevertheless, we determine at this juncture that claim 1 does not require prediction of estimated remaining battery charge life. *See supra* § II.C.2. Thus, although Hayasaka appears to teach prediction of estimated remaining battery charge life (*see* Ex. 1003 ¶ 133; Ex. 1011, 5:15–25, 5:28–32), Petitioner need not show this to establish obviousness under our interpretation. We have determined above that Sakamoto teaches predicting estimated remaining battery charge level (*see supra* § II.D), so we need not further address this ground at this time.

III. CONCLUSION

After considering the evidence and arguments presented in the Petition and the Preliminary Response, we determine that Petitioner has demonstrated a reasonable likelihood that it would prevail with respect to at least one claim challenged in the Petition. Accordingly, we institute an *inter partes* review on all of the challenged claims and all grounds presented in the Petition. At this stage of the proceeding, we have not made a final determination as to the patentability of the challenged claim.

IV. ORDER

Accordingly, it is

ORDERED that pursuant to 35 U.S.C. § 314, *inter partes* review is instituted as to claims 1, 4–6, 8, 10, 13, and 15 of the ’774 patent with respect to all grounds of unpatentability presented in the Petition; and

FURTHER ORDERED that *inter partes* review is commenced on the entry date of this Order, and pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial.

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,

Petitioner

v.

LBT IP I LLC,

Patent Owner

Case IPR2020-01189
U.S. Patent No. 8,497,774

PATENT OWNER'S RESPONSE TO PETITION FOR *INTER PARTES* REVIEW OF U.S. PAT. NO. 8,497,774

unit and adjusts a power level applied to location tracking circuitry responsive to one or more signal levels, the power level comprising a multitude of threshold values determined by a user or system administrator to intermittently activate or deactivate the location tracking circuitry to conserve power of the charging unit in response to the estimated charge level of the charging unit" as required by independent claim 8 and its dependent claims, including challenged claims 10, 13, and 15. Ex. 1001 at 16:53-61.

The Petitioner relies on *Sakamoto* as disclosing this limitation. More specifically, in relation to "the power level comprising a multitude of threshold values determined by a user or system administrator," the Petitioner asserts:

> *Sakamoto* discloses that the remaining battery amount (power level of the charging unit) has two thresholds against which it is compared to determine the positioning mode. *Sakamoto* discloses that, when the battery power falls below a first, user-defined threshold, the positioning mode switches from high sensitivity positioning mode to normal sensitivity mode, thereby causing the GPS receiver to be intermittently activated (as claimed), as opposed to the continuous activation of high sensitivity positioning mode. *Sakamoto*, [0029].

Pet. at 50. That is, the Petitioner acknowledges that *Sakamoto* discloses only two thresholds for three operating modes.

The Petitioner, however, does not explicitly address the claim term "multitude" or the phrase "multitude of threshold values." Rather, the Petitioner appears to assert that *Sakamoto's* two thresholds are sufficient to form a multitude. Both the intrinsic and extrinsic evidence, however, demonstrate that a multitude in the context of the '774 Patent is necessarily more than two.

The limitation requiring a "multitude of threshold values" was added by the patentee during prosecution to overcome an objection under 35 U.S.C. 102(e). Ex. 1002 at 9/10/2012 Applicant Argument, pp. 10-11. The examiner initially objected to claim 8 as anticipated by U.S. Patent No. 7,826,968 to Huang, et al. ("*Huang*"). Ex. 1002 at 6/8/2012 Non-Final Rejection, p. 2. *Huang* was directed in part to a GPS device that adjusts its frequency of positioning updates (*i.e.*, a "position signal") based on the speed of movement of the device:

> The position signal is updated every time interval. The duration of the time interval is changed dynamically to control the times of the position signal S_L generated by baseband unit 122 during a one second period, or the position locating frequency of the GPS device 100. In this embodiment, ***the duration of the time interval is changed according to a speed of movement or a direction of movement of the GPS device 100***, a remaining battery capacity (not shown) of the GPS device 100, or the number of the satellites.

Ex. 2011 at 2:43-52 (emphasis added). *Huang* further disclosed two preset speed-of-movement thresholds for adjusting the frequency of positioning updates:

> When the speed of movement of the GPS device 100 exceeds a preset value, the duration of the time interval is reduced in order to more quickly obtain the position of the GPS device 100. FIG. 2A shows a mapping function corresponding to instances of generating a position signal by baseband unit 122 during a one second period and the speed of movement of the GPS device 100. ***When the speed of movement of the GPS device 100 exceeds 100 (Km/hr), the position signal is generated by baseband unit 122 10 times during a one second period. In other words, the position signal is generated by baseband unit 122 once every 0.1 seconds.*** Thus, the position locating frequency of the GPS device 100 is 10 Hz. ***When the speed of movement of the GPS device 100 is approximately 50(Km/hr), the position signal is generated by baseband unit 122 5 times during a one second period. In other words, the position signal is generated by baseband unit 122 once every 0.2 seconds.*** Thus, the position locating frequency of the GPS device 100 is 5 Hz. In summary, the frequency of generating the position signal by baseband unit 122 is higher when the speed of movement of the GPS device 100 is faster.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,

Petitioner

v.

LBT IP I LLC,

Patent Owner

Case No. IPR2020-01189
U.S. Patent No. 8,497,774

PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

c) Sakamoto's stop-position searching mode has a regular refresh rate

Patent Owner's interpretation of *Sakamoto's* teachings of power-off mode ignores the undisputed evidence that, in power-off mode, *Sakamoto's* system has a refresh rate of 0Hz. *Andrews Declaration,* ¶ 94, 98.

d) Patent Owner does not dispute that switching the positioning mode updates the communication signaling protocol

Finally, it is undisputed that a POSITA would have appreciated that switching the positioning mode updates the communication signaling protocol. *Petition* at 31 (citing *Andrews Declaration* at ¶ 89). As argued in the Petition and summarized above, each position mode has a different GPS refresh rate (the claimed "listen rate"). Hence, when *Sakamoto* updates the positioning mode responsive to the battery charge level, the communication signaling protocol and therefore the listen rate is also adjusted, as required by the claims. Accordingly, Patent Owner's arguments that *Sakamoto* fails to teach claims limitations 1(e) and 8(c) fail even if the claims are interpreted to require updating a recurring schedule of events.

B. Limitation 8(d): *Sakamoto* teaches a "multitude" of thresholds

1. Sakamoto Teaches at Least Four Threshold Values

Patent Owner argues, based on its proposed interpretation of "multitude," that *Sakamoto* fails to teach that "the battery power level monitor … adjusts a power level applied to location tracking circuitry responsive to one or more signal levels, the power

level comprising a multitude of threshold values," because Patent Owner reads *Sakamoto* as teaching only two thresholds. *Response* at 12–13. However, as discussed below *Sakamoto* in fact teaches at least *four* distinct threshold values for changing the power level applied to the location tracking circuitry, thereby satisfying even Patent Owner's proposed interpretation.

First, as argued in the Petition, "*Sakamoto* discloses that the remaining battery amount (power level of the charging unit) has two thresholds against which it is compared to determine the positioning mode." *Petition* at 50; *see also* 51–54 (describing these two thresholds). Patent Owner does not dispute that *Sakamoto* teaches these two thresholds or that they otherwise satisfy the requirements of the claim limitation; Patent Owner only asserts that these two thresholds are insufficient to be a "multitude." *Response* at 17 ("*Sakamoto's* two thresholds are not a multitude."). However, *Sakamoto* teaches additional thresholds beyond these two, namely thresholds associated with a GPS signal level. As Claim 8(d) merely recites adjusting the power level responsive to "one or more signal levels" without reference to a particular *type* of signal level, *Sakamoto's* teaching of multiple threshold values for each of a battery power level and a GPS signal level satisfies the Claim 8(d).

In particular, *Sakamoto* teaches that the power level applied to the GPS receiver can be increased (to set the GPS receiver to high sensitivity positioning mode) when the GPS signal level is below a predetermined threshold K1, or decreased (to set the GPS

receiver to normal sensitivity mode) when GPS signal level exceeds "a threshold value K2 different from the threshold value K1." *Andrews Declaration* at ¶ 58 (quoting *Sakamoto* at ¶ [0027]). This is also consistent with Mr. Andrews's deposition testimony discussing how *Sakamoto* teaches transitioning between positioning modes based on the GPS signal level. Ex. 2003 (*Andrews Deposition*), 30:16–31:13; 39:7–41:5. Still further, this is consistent with the disclosure of the '774 Patent, which discusses both satellite signal levels and battery charge levels as having associated thresholds used for adjusting the cycle timing. '774 Patent 7:56–59 (thresholds for satellite signal level); 13:60–62 (battery power level threshold values). As such, the evidence is undisputed that *Sakamoto* teaches at least two battery level thresholds, and at least two GPS signal level thresholds for a total of four thresholds, all of which are used to transition positioning mode and therefore adjust the cycle timing.

These GPS signal level thresholds are used as the basis to "intermittently activate or deactivate the location tracking circuitry" for the same reasons discussed in the Petition with respect to the battery level thresholds at least because *Sakamoto* uses the same modes with both sets of thresholds. For example, *Sakamoto* may transition into normal mode either in response to a strong GPS signal (*see, e.g., Sakamoto* at ¶ 0027) or in response to a low battery level (*see, e.g.*, *id.* at ¶¶ [0028]–[0029]).

Like the battery level thresholds, the purpose of the signal level thresholds is "to conserve power of the charging unit." *Andrews Declaration* at ¶ 58. Furthermore, Mr.

Andrews opines "the various thresholds (including the signal thresholds K1 and K2 and the first battery threshold) are configurable by the user using the man-machine interface." *Id.* at ¶ 104. As such, the at least two GPS signal level thresholds also satisfy the claim requirement that they be "determined by a user or system administrator." Thus, all four thresholds collectively act to set the operating mode, and do so based at least in part "in response to the estimated charge level of the charging unit."

In summary, *Sakamoto* teaches adjusting a power level applied to location tracking circuitry responsive to one or more (here, two) signal levels, the power level comprising a multitude (here, four) of threshold values determined by a user or system administrator to intermittently activate or deactivate the location tracking circuitry to conserve power of the charging unit in response to the estimated charge level of the charging unit. Accordingly, Patent Owner's argument that *Sakamoto* fails to teach a "multitude" of thresholds fails even under their proposed interpretation of the claim term "multitude."

2. *Petitioner's Argument Applying Sakamoto's Additional Thresholds Properly Responds to Patent Owner's New Claim Construction*

While "[i]t is of the utmost importance that petitioners in the IPR proceedings adhere to the requirement that the initial petition identify 'with particularity' the 'evidence that supports the grounds for the challenge to each claim'" (*Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3))), arguments presented in a Reply that do not cite any

new evidence or previously unidentified portions of a prior art reference will not generally be an impermissible new theory of unpatentability. *Apple Inc. v. Andrea Electronics Corp.*, 949 F.3d 697, 706 (Fed. Cir. 2020). Furthermore, "any ambiguity as to whether [Petitioner] raised a new argument on reply is eliminated when we consider whether [Petitioner's] reply arguments are responsive to arguments raised in [Patent Owner's] Response." *Id.*

Here, this Reply responds at the first opportunity to unforeseeable claim interpretation arguments advanced by the Patent Owner in its Preliminary Response and Patent Owner Response and cites only evidence previously identified by Mr. Andrews and discussed in Patent Owner's deposition of Mr. Andrews. As such, Petitioner respectfully submits that discussing *Sakamoto's* further thresholds is not an impermissible new argument or new grounds of patentability.

IV. CONCLUSION

For all of the reasons articulated in the Petition and herein, Petitioner respectfully requests the Board find all Challenged Claims unpatentable.

Respectfully submitted,

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ATTORNEYS FOR PETITIONER
APPLE INC.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,

Petitioner

v.

LBT IP I LLC,

Patent Owner

Case IPR2020-01189
U.S. Patent No. 8,497,774

PATENT OWNER'S SUR-REPLY TO PETITIONER'S REPLY

IWASHINGTON\000150560\0001\585600.v1-6/1/21

The primary source of evidence for claim construction is intrinsic evidence; that is, "the patent itself, including the claims, the specification and, if in evidence, the prosecution history." *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed.Cir.1996). The words used in a claim are generally given their ordinary and customary meaning. *Phillips v AWH Corp.*, 415 F.3d 1303, 1313-14 (Fed.Cir.2005)(en banc). However, "the 'ordinary meaning' of a claim term is its meaning to the ordinary artisan after reading the entire patent." *Id.* at 1321. The correct construction of a claim term is one "that stays true to the claim language and most naturally aligns with the patent's description of the invention." *Id*. at 1316 (quoting *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1250 (Fed.Cir.1998)).

The Board may also consider extrinsic evidence, such as dictionaries, treatises, and expert testimony to the extent it is consistent with the intrinsic evidence. *Id*. at 1319. However, extrinsic evidence may not contradict the language of the claims or the teachings of the specification. *Helmsderfer v. Bobrick Washroom Equip., Inc.*, 527 F.3d 1379, 1382 (Fed.Cir.2008). "If more than one dictionary definition is consistent with the use of the words in the intrinsic record, the claim terms may be construed to encompass all consistent meanings." *Brookhill-Wilk I, LLC v Intuitive Surgical Inc.*, 334 F.3d 1294, 1300 (Fed.Cir.2003) (citing *Tex. Digital Sys. Inc. v. Telegenix, Inc.*, 308 F.3d 1193, 1203 (Fed.Cir.2002)).

"Where there are several common meanings for a claim term, the patent disclosure serves to point away from the improper meanings and toward the proper meaning." *Renishaw PLC*, 158 F.3d at 1250; *see also Tex. Digital*, 308 F.3d at 1203. If after applying the rules of construction a claim term remains susceptible to more than one reasonable interpretation, the term is to be construed in a way that preserves the validity of the patent. *Phillips*, 415 F.3d at 1327.

Patent Owner asserts that, in light of intrinsic and extrinsic evidence and consistent with claim construction rules in view of *Phillips*, a proper interpretation of "multitude" is "necessarily more than two", which also encompasses "a number larger than four".

A. Patent Owner's Prosecution History Disclaimer Is "Clear and Unequivocal"

Petitioner contends:

> Given Applicant failed to provide any argument to distinguish the amended claims over the teachings of *Huang*, and given *Huang* teaches a 'multitude' of thresholds under Patent Owner's construction, any alleged prosecution disclaimer is "ambiguous, or even amenable to multiple reasonable interpretations."

Reply at 6-7. However, rather than presenting any evidence that the amendment to incorporate as-filed claim 17 into claim 8 by the original applicant for the '774 Patent

("Applicant") does not provide a clear and unequivocal intent to define "multitude" as more than two, Petitioner theorizes that "*Huang* teaches more than two thresholds" and "*Huang* teaches a 'multitude' of thresholds under Patent Owner's construction." *Id*. at 5, 6. That is, Petitioner implicitly acknowledges that the only reasonable interpretation of Applicant's intent is that "multitude" necessarily means more than two and argues that *Huang* teaches this reasonable interpretation.

Patent Owner notes the Examiner stated:

patentability resides in "wherein the power level comprises a multitude of threshold value[s] determined by a user or system administrator to intermittently activate or deactivate the location tracking circuitry to conserve power of the power charging unit in response to the estimated charge level of the power unit."

Ex. 1002 at 272. In response, Applicant argued "[a]pplicants respectfully submit that Huang fails to disclose at least these elements of claim 8, which were previously recited in canceled claims 16 and 17." *Id*. at 298. That is, Applicant explicitly provided arguments that the proposed amendments distinguished over *Huang*. Although the amended limitations included more than "a multitude of threshold values", the only unambiguous and reasonable interpretation is that the Applicant intended to further distinguish over the prior art by, in part, defining "multitude" as necessarily greater than two.

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Paper 39
Date: March 2, 2022

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

LBT IP I LLC,
Patent Owner.

IPR2020-01189
Patent 8,497,774 B2

Before JOHN A. HUDALLA, SHEILA F. McSHANE, and
JULIET MITCHELL DIRBA, *Administrative Patent Judges*.

HUDALLA, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
Denying Patent Owner's Motion to Amend
35 U.S.C. § 318(a)

Apple Inc. ("Petitioner") filed a Petition (Paper 1, "Pet.") requesting an *inter partes* review of claims 1, 4–6, 8, 10, 13, and 15 ("the challenged claims") of U.S. Patent No. 8,497,774 B2 (Ex. 1001, "the '774 patent"). LBT IP I LLC ("Patent Owner") filed a Preliminary Response (Paper 8, "Prelim. Resp."). Taking into account the arguments presented in Patent

Owner's Preliminary Response, we determined that the information presented in the Petition established that there was a reasonable likelihood that Petitioner would prevail with respect to its unpatentability challenges. Pursuant to 35 U.S.C. § 314, we instituted this proceeding on March 4, 2021, as to all challenged claims and all grounds of unpatentability. Paper 9 ("Dec. on Inst.").

During the course of trial, Patent Owner filed a Patent Owner Response (Paper 17, "PO Resp."), and Petitioner filed a Reply to the Patent Owner Response (Paper 25, "Pet. Reply"). Patent Owner also filed a Sur-reply. Paper 31 ("PO Sur-reply").

In addition, Patent Owner filed a contingent motion to amend (Paper 16, "MTA") proposing to substitute claims 20, 23–25, 27, 29, 32, and 34[1] for claims 1, 4–6, 8, 10, 13, and 15, respectively, if we are to determine claims 1, 4–6, 8, 10, 13, and 15 unpatentable. Petitioner filed an opposition to the motion to amend. Paper 26 ("MTA Opp."). On September 24, 2021, pursuant to Patent Owner's request (*see* MTA 2), we issued Preliminary Guidance on Patent Owner's motion to amend. Paper 28 ("PG"). Patent Owner then filed a reply in support of its motion to amend (Paper 30 ("MTA Reply")), to which Petitioner filed a sur-reply (Paper 36 ("MTA Sur-reply")).

An oral hearing was held on December 8, 2021, and a transcript of the hearing is included in the record. Paper 38 ("Tr.").

Petitioner filed Declarations of Scott Andrews with its Petition (Ex. 1003) and with its Reply and opposition to the motion to amend

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[1] *See infra* § III.B.2.

(Ex. 1077). Both parties filed a transcript of the deposition of Mr. Andrews. Exs. 1068, 2003.

We have jurisdiction under 35 U.S.C. § 6. This decision is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of claims 1, 4–6, 8, 10, 13, and 15 of the ’774 patent. For the reasons discussed below, Petitioner has demonstrated by a preponderance of the evidence that claims 1, 4–6, 8, 10, 13, and 15 of the ’774 patent are unpatentable. We also *deny* Patent Owner’s motion to amend.

I. BACKGROUND

A. Real Parties-in-Interest

Petitioner identifies Apple Inc. as the real party-in-interest. Pet. 72. Patent Owner identifies LBT IP I LLC as the real party-in-interest. Paper 3, 2; Paper 6, 2.

B. Related Proceedings

The parties identify the following proceedings related to the ’774 patent (Pet. 72; Paper 3, 2; Paper 6, 2):

LBT IP I LLC v. Apple Inc., No. 1:19-cv-01245-UNA (D. Del. filed July 1, 2019); and

IPR2020-01190, IPR2020-01191, IPR2020-01192, and IPR2020-01193, in which Petitioner challenges other patents owned by Patent Owner. We issue final written decisions in IPR2020-01190, IPR2020-01191, IPR2020-01192, and IPR2020-01193 concurrently with this Decision.

C. The '774 patent

The '774 patent is directed to location and tracking communication systems. Ex. 1001, 1:33–34. Figure 1 of the '774 patent is reproduced below.

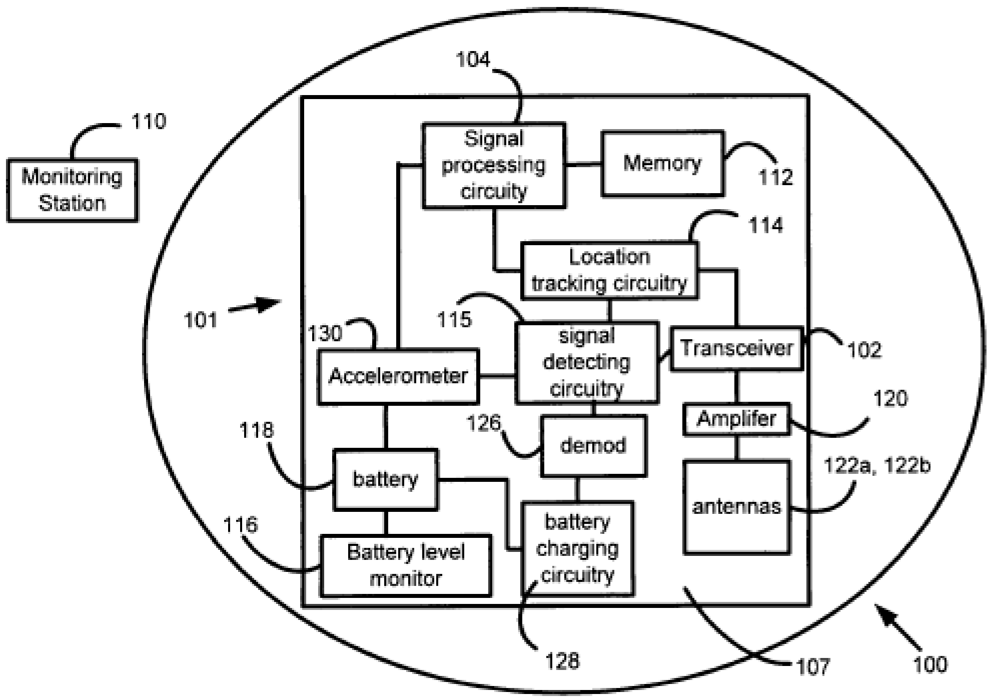

Figure 1

Figure 1 depicts a schematic of tracking device 100, which contains electronic components 101 such as transceiver 102, signal processing circuitry 104 (e.g., a microprocessor or other signal logic circuitry), and accelerometer 130. *Id.* at 4:62–64, 6:54–57. Location tracking circuitry 114 (e.g., global positioning system (GPS) circuitry) calculates location data received and sends the data to signal processing circuitry 104. *Id.* at 7:17–19. Signal detecting circuitry 115 detects and measures signal power level. *Id.* at 7:22–23. Battery level monitor 116 detects a battery level of battery 118. *Id.* at 7:25–28.

Tracking device 100 periodically checks availability of a GPS signal by performing a GPS signal acquisition to determine if a receive communication signal is above a first signal level. *Id.* at 8:7–10. Location tracking circuitry 114 or transceiver 102 may be placed in a sleep or standby mode to conserve a battery level of battery 118. *Id.* at 8:4–8. Electronic tracking device 100 may resume GPS signal acquisition using GPS satellites when the acquired receive communication signal level is above the first signal level. *Id.* at 8:10–16.

Accelerometer 130 may also activate if a power level of the receive communication signal (e.g., GPS signal) is insufficient for processing. *Id.* at 10:47–49. In this case, processing unit 104 computes current location coordinates using acceleration measurements. *Id.* at 10:53–54. When the receive communication signal again becomes sufficient for processing, accelerometer 130 is deactivated and location tracking circuitry 114 is activated. *Id.* at 10:58–67. In this case, processing unit 104 resumes the calculation of location coordinates from the receive communication signal. *Id.*

Figure 4 of the ’774 patent is reproduced below.

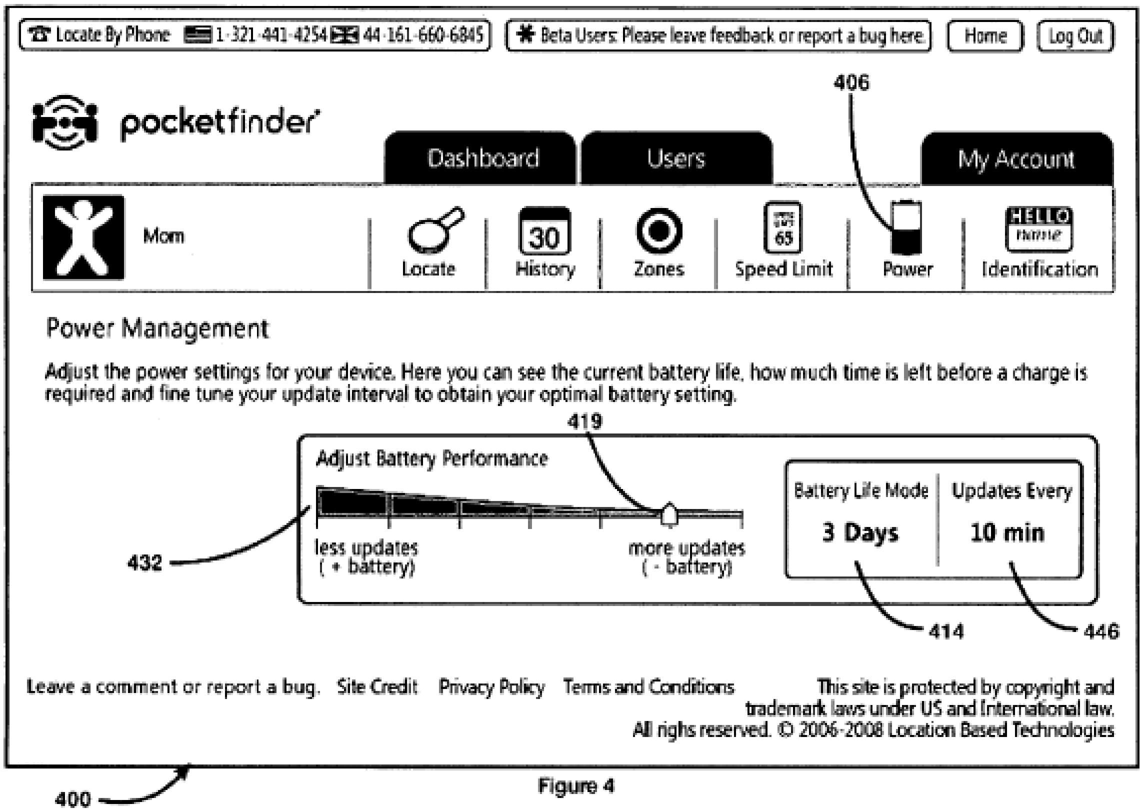

Figure 4

Figure 4, above, depicts screen display 400 of a personal communication device including a user definable adjustable power level monitor for an electronic tracking device. *Id.* at 5:5–7, 11:2–4, 11:12–17. Battery level monitor 116 measures in real-time battery charge level 406 of battery 118 and predicts estimated remaining battery charge life 414 in response to battery charge level 406. *Id.* at 11:22–25, 13:52–58. Battery level monitor 116 also adjusts the power level applied to location tracking circuitry 114 or transceiver 102 responsive to one or more signal levels. *Id.* at 13:52–58.

A local battery power adjustment mechanism generates in substantially real-time an updated set of network communication signaling protocols including, for example, update rate 446 (e.g., refresh rate) of

location coordinate packets. *Id.* at 11:31–36. Update rate 446 consists of a request rate of location coordinate packets by the target host and/or a listen rate of location coordinate packets by the portable electronic tracking device. *Id.* at 11:36–41. The local battery power adjustment mechanism includes user-adjustable slider 432[2] to graphically display in substantially real-time the trade-off relationships between remaining battery charge level 414 and update rate 446 of location coordinate packets. *Id.* at 11:53–57. The user may select a multitude of threshold values via slider 432 to intermittently activate or deactivate location tracking circuitry 114 in order to conserve the power of battery 118. *Id.* at 13:58–67. For example, the user may adjust slider 432 to choose a range of values between a lower update rate 446 (and less battery usage) and a higher update rate 446 (and more battery usage). *Id.* at 11:53–57, Fig. 4. This results in "an appropriate update[d] set of network communication signaling protocols to achieve a desired user defined battery operating environment, e.g., obtain optimal battery life, obtain optimal update rate, [and the] tradeoffs between them." *Id.* at 11:58–63. This further may result in the local battery power adjustment mechanism communicating a message to activate or deactivate a portion of the transceiver circuitry, processor circuitry, or location tracking circuitry. *Id.* at 11:44–53.

The '774 patent issued from Application No. 12/419,451 ("the '451 application") filed on April 7, 2009, which is a continuation-in-part of six applications. Ex. 1001, codes (21), (63). As discussed below, Petitioner

[2] Slider 432 is also called "user adjustable screen icon 432," "on-line user adjustable cursor display 432," and "active display 432" in the Specification of the '774 patent. *See, e.g.*, Ex. 1001, 11:53–57, 13:13–18, 13:58–67.

applies the April 5, 2007, filing date of two of these six applications (i.e., the earliest possible effective filing date) for qualifying the asserted references as prior art. *See* Pet. 3, 7–8.

D. Illustrative Claim

Of the challenged claims of the ’774 patent, claims 1 and 8 are independent. Claims 4–6 depend directly or indirectly from claim 1, and claims 10, 13, and 15 depend from claim 8. Claim 1 is illustrative of the challenged claims and recites:

> 1. A portable electronic tracking device to monitor location coordinates of one or more individuals and objects using a satellite navigation system, the portable electronic tracking device comprising:
>
> a battery having a battery charge level;
>
> transceiver circuitry;
>
> processor circuitry;
>
> a battery power monitor to measure in real-time the battery charge level and to make a prediction of an estimated remaining battery charge level in response to the battery charge level;
>
> local battery power adjustment mechanism to generate in substantially real-time an updated set of network communication signaling protocols associated with at least one of a request rate of location coordinate packets to be communicated to a target host and a listen rate of the location coordinate packets from a satellite navigation system, the updated set of network communication signaling protocols having a value that is responsive to a user input request;
>
> wherein the local battery power adjustment mechanism actives or deactivates at least one portion of the transceiver

circuitry or the processor circuitry to conserve the battery charge level in response to the value.

Ex. 1001, 15:46–16:2.

E. Prior Art

Petitioner relies on the following prior art:

Japanese Unexamined Patent Application Publication No. JP 2004-37116A, published Feb. 5, 2004 (Ex. 1004, "Sakamoto");[3]

Applicants' Admitted Prior Art (Ex. 1001, 11:22–30, "AAPA");

U.S. Patent No. 5,845,142, filed Aug. 29, 1997, issued Dec. 1, 1998 (Ex. 1011, "Hayasaka").

F. The Instituted Grounds

We instituted *inter partes* review of claims 1, 4–6, 8, 10, 13, and 15 of the '774 patent on the following grounds (Dec. on Inst. 29), which are all the grounds presented in the Petition (Pet. 6):

Claims Challenged	35 U.S.C. §	References/Basis
1, 4–6, 8, 10, 13, 15	103(a)[4]	Sakamoto
1, 4–6, 8, 10, 13, 15	103(a)	Sakamoto, AAPA

[3] Sakamoto is a Japanese-language publication (Ex. 1004, 36–49, 58) that was filed with an English-language translation (*id.* at 1–19, 21–34, 52–56) and declarations attesting to the accuracy of the translation (*id.* at 20, 50). Our citations to Sakamoto herein refer to the translation.

[4] The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102, 103, and 112. Because the '774 patent was filed before March 16, 2013 (the effective date of the relevant amendments), the pre-AIA versions of §§ 102, 103, and 112 apply.

Claims Challenged	35 U.S.C. §	References/Basis
1, 4–6, 8, 10, 13, 15	103(a)	Sakamoto, Hayasaka

II. ANALYSIS

A. Legal Standards

A claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, so-called secondary considerations.[5] *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). We also recognize that prior art references must be "considered together with the knowledge of one of ordinary skill in the pertinent art." *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994) (citing *In re Samour*, 571 F.2d 559, 562 (CCPA 1978)).

B. Level of Ordinary Skill in the Art

Citing testimony from Mr. Andrews, Petitioner contends a person of ordinary skill in the art (or "POSITA") "would have had a bachelor's degree in Electrical Engineering, Computer Engineering, Computer Science, or an

[5] The trial record does not include any evidence of secondary considerations of nonobviousness.

equivalent degree, with at least two years of experience in GPS navigation, portable tracking devices, or related technologies." Pet. 3 (citing Ex. 1003 ¶¶ 29–30). For purposes of our Decision on Institution, we adopted Petitioner's definition of the level of ordinary skill in the art without the qualifier "at least." Dec. on Inst. 10. Patent Owner states that it adopts this definition. MTA 16. Thus, we discern no reason to change the level of ordinary skill in the art applied in this Final Written Decision. Accordingly, a person of ordinary skill in the art would have had a bachelor's degree in Electrical Engineering, Computer Engineering, Computer Science, or an equivalent degree, with two years of experience in GPS navigation, portable tracking devices, or related technologies. We determine that this definition comports with the level of skill necessary to understand and implement the teachings of the '774 patent and the asserted prior art.

C. Claim Interpretation

In an *inter partes* review, we construe each claim "in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent." 37 C.F.R. § 42.100(b). Accordingly, our claim construction standard is the same as that of a district court. *See id.* Under the standard applied by district courts, claim terms are generally given their plain and ordinary meaning as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc). "There are only two exceptions to this general rule: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when

the patentee disavows the full scope of a claim term either in the specification or during prosecution." *Thorner v. Sony Comput. Entm't Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012).

1. "Multitude"

Claim 8 recites a "power level comprising a multitude of threshold values." Ex. 1001, 16:56–57. In its obviousness analysis, Petitioner relies on Sakamoto for teaching two such threshold values. *See* Pet. 50–51. In the Preliminary Response, Patent Owner contended that Petitioner's showing of two threshold values was not sufficient to teach the recited "multitude" of claim 8. Prelim. Resp. 16–17. We construed "multitude" to include two thresholds for purposes of our Decision on Institution, and we encouraged the parties to further address the interpretation of the term during trial. Dec. on Inst. 12.

In post-institution briefing, Patent Owner contends that "a multitude in the context of the '774 Patent is necessarily more than two," i.e., three or more. PO Resp. 12–17; PO Sur-reply 2–4. Petitioner asks us to maintain our construction that a "multitude" includes two. Pet. Reply 1–10. We now consider the parties' arguments and the evidence of record pertaining to the construction of "multitude."

At the outset, we note that an exemplary embodiment in Figure 4 of the '774 patent depicts 5–7 thresholds. *See* Ex. 1001, 13:58–67, Fig. 4 (432). In our Decision on Institution, we found that these 5 or 7 thresholds are not a benchmark for what constitutes a "multitude" in claim 8. Dec. on Inst. 11 (citing *Hill-Rom Servs., Inc. v. Stryker Corp.*, 755 F.3d 1367, 1371 (Fed. Cir. 2014)). During the course of trial, both parties acknowledged the

exemplary embodiment in Figure 4 (PO Resp. 16; Pet. Reply 8; PO Sur-reply 5–7), but neither party contends that the 5–7 thresholds depicted therein should limit our interpretation of "multitude." Thus, we maintain our determination from the Decision on Institution that the embodiment of Figure 4 with 5–7 thresholds constitutes a non-limiting example.

Patent Owner contends that another portion of the Specification of the '774 patent supports an interpretation of "multitude" as being three or more. PO Sur-reply 6–7. Specifically, Patent Owner cites the following passage: "Advantageously as compared to conventional tracking devices, user input request 430 adjusts value 419 to select an appropriate update set of network communication signaling protocols to achieve a desired user defined battery operating environment, e.g., *obtain optimal battery life, obtain optimal update rate, tradeoffs between them*." *Id.* (quoting Ex. 1001, 11:58–67) (emphasis added). Patent Owner contends this language "clearly discloses that a threshold value may be any value along a line between two end points, including the end points (*i.e.*, 'obtain optimal battery life' as one end point, 'obtain optimal update rate' as another end point, and 'tradeoffs between them' as any value along the line)." *Id.* at 7. At oral argument, Patent Owner also emphasized that the plural "tradeoffs" supported its interpretation, because values between the endpoints allegedly represent tradeoffs. *See* Tr. 29:20–32:13. Thus, Patent Owner interprets "the number of available values" as being "at least three (*i.e.*, each end point and the value depicted as 419)." *Id.* Petitioner disputes Patent Owner's position because "the '774 Specification establishes, at best, only 5–7 thresholds." Pet. Reply 8.

We do not agree with Patent Owner that the Specification's statement about tradeoffs between "optimal battery life" and "optimal update rate" necessarily requires a spectrum of at least three threshold values (i.e., two endpoints and at least one value between them). If anything, this statement supports the view that such tradeoffs can be made between as few as two points: an endpoint where less updates are traded for better battery life, and an endpoint where worse battery life is traded for more updates. *See* Ex. 1001, Fig. 4 (slider 432). We also do not ascribe any significance to the plural "tradeoffs" in Patent Owner's cited statement, because every point in such a spectrum would involve its own tradeoffs between battery life and update frequency. Thus, we agree with Petitioner that the Specification does not support Patent Owner's interpretation of a multitude as necessarily being three or more. We also consider the Specification's statement about "obtain[ing] optimal battery life, obtain[ing] optimal update rate, [and the] tradeoffs between them" (Ex. 1001, 11:58–63) to at least be consistent with the notion that "multitude" means two or more in the context of the '774 patent.

Patent Owner also contends that the prosecution history of the application that issued as the '774 patent supports an interpretation of "multitude" as being three or more. Specifically, Patent Owner cites the patentees' amendment of claim 8,[6] which Patent Owner alleges was made to overcome a rejection of the claim based on U.S. Patent No. 7,826,968 (Ex. 2011, "Huang"). PO Resp. 14 (citing Ex. 1002, 270, 297–98). Patent Owner further contends that Huang discloses "two preset speed-of-

[6] Prosecution claim 8 issued as claim 8 in the '774 patent, so we refer to it simply as "claim 8."

movement thresholds for adjusting the frequency of positioning updates."[7] *Id.* at 14–16 (citing Ex. 2011, 2:43–52, 2:55–3:8). According to Patent Owner, the patentees made the amendment "in order to overcome prior art that disclosed two thresholds," so "the amendment is intrinsic evidence of the patentee[s'] clear intent to define 'multitude' as more than two." *Id.* at 16; *see also* PO Sur-reply 3–4 (same argument).

Petitioner notes that the patentees amended claim 8 to include the limitations of prosecution claim 17, which the patent examiner indicated was allowable. Pet. Reply 3–4 (citing Ex. 1002, 297–99). Petitioner argues that the added language from prosecution claim 17 "includes at least four distinct limitations: (1) a multitude of thresholds; (2) determined by a user or system administrator; (3) to intermittently activate or deactivate the location tracking circuitry to conserve power of the charging unit; and (4) in response to the estimated charge level of the charging unit." *Id.* Petitioner further notes that the patentees "did not present any substantive arguments distinguishing this amendment over Huang, but only relied on the Examiner's indication that claim 17 was allowable." *Id.* at 4. For these reasons, Petitioner contends that "any alleged prosecution disclaimer is 'ambiguous, or even amenable to multiple reasonable interpretations.'" *Id.* at 3, 6–7 (quoting *Avid Tech., Inc. v. Harmonic, Inc.*, 812 F.3d 1040, 1045 (Fed. Cir. 2016)).

We agree with Petitioner. First, the patentees added the limitations of prosecution claim 17 (and intervening prosecution claim 16) after the patent

[7] Petitioner disputes that Huang teaches only two thresholds. Pet. Reply 5–6. We need not resolve this dispute because we dispose of the instant prosecution history argument based on other grounds.

examiner objected to prosecution claim 17 "as being dependent upon a rejected base claim, but . . . allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims." Ex. 1002, 271–72. The patentees' amendment rewrote prosecution claim 17 in independent form, which included base claim 8. *Id.* at 292–94, 297–98. The patentees made no arguments relative to the previous rejection of claim 8 (based on Huang), at which time claim 8 did not include the additional limitations of prosecution claims 16 and 17. *See id.* This undermines Patent Owner's suggestion that the amendment was made to overcome Huang. Second, we agree with Petitioner that, even if we were to consider the amendment of claim 8 to be responsive to the Huang rejection, the patentees' addition of multiple different limitations to claim 8 (Ex. 1002, 297; Pet. Reply 3) does not make it "clear and unmistakable" that the amendment was directed to and disclaimed devices with two thresholds. *3M Innovative Props. Co. v. Tredegar Corp.*, 725 F.3d 1315, 1325 (Fed. Cir. 2013). Thus, we do not find Patent Owner's cited prosecution history supports a construction of "multitude" as being three or more.

Patent Owner additionally argues that we should rely on evidence of the plain and ordinary meaning of "multitude" from contemporaneous dictionaries only in the sense that it means "a large number or amount." PO Resp. 17 (citing Ex. 3001, 4; Ex. 3002, 4). As such, Petitioner cites "synonyms for 'multitude' [that] include 'host,' 'legion,' and 'army,' all of which 'denote a very great number of people or things.'" *Id.* (citing Ex. 3001, 3). Petitioner contends that we should interpret "multitude" as synonymous with "plurality" based on "substantially identical dictionary definitions for the two terms and one dictionary that defined 'plurality' as

'multitude.'" Pet. Reply 1 (citing Dec. on Inst. 11–12). Petitioner also contends that none of the dictionary definitions in evidence "is consistent with drawing a line between two and three, or with drawing a line between two and 'between five and seven.'" *Id.* at 9.

In our Decision on Institution, we stated "that one dictionary . . . defines 'plurality' as 'a multitude,'" which supports a construction of "multitude" as "at least two" in accordance with universally applied patent practice. Dec. on Inst. 12 (citing Ex. 3001, 4; *SIMO Holdings Inc. v. Hong Kong uCloudlink Network Tech. Ltd.*, 983 F.3d 1367, 1377 (Fed. Cir. 2021)). Patent Owner asks us to instead focus on definitions of multitude as being "a large number or amount." PO Resp. 17. We note, however, that such definitions are inconsistent with Patent Owner's position that a multitude of thresholds could encompass as few as three thresholds. In other words, we do not agree that three is consistent with a "host," "legion," "army," or "a very great number of people or things." Ex. 3001, 3. Nor has Patent Owner put forth evidence suggesting that two must be excluded from what is considered a multitude. Given the breadth of dictionary definitions in evidence, we find that this extrinsic evidence does not support limiting the definition of "multitude" to three or more as suggested by Patent Owner. Instead, we find that the breadth of the dictionary definitions in evidence supports our initial construction that "multitude" includes two. *See, e.g.*, *id.*; Ex. 3002, 3.

Finally, we consider Patent Owner's argument based on the patent law maxim "that claims should be construed to preserve their validity." *Phillips* 415 F.3d at 1327; *see also* PO Sur-reply 3, 5 (citing same). Specifically, Patent Owner makes the following argument:

> Since a claim term must be construed in a way that preserves validity and Petitioner asserts that a construction of "multitude" as a number that is less than five lacks written description support, the only proper interpretation of "multitude" is "a number that is necessarily more than two", which also encompasses a number larger than four.

PO Sur-reply 6.

We do not agree with Patent Owner's argument. *Phillips* is clear that the "preserving validity" maxim is limited "to cases in which the [Board] concludes, after applying all the available tools of claim construction, that the claim is still ambiguous." *Phillips*, 415 F.3d at 1327 (internal quotation omitted). At the oral hearing, Patent Owner conceded that "multitude" was not ambiguous; rather, Patent Owner only sought to invoke the maxim to the extent that we might agree with Petitioner's claim construction arguments. Tr. 29:1–19. This undermines any suggestion that the term is ambiguous. Thus, just like the court in *Phillips*, we can construe "multitude" "without the need to consider whether one possible construction would render the claim invalid while the other would not." *Phillips*, 415 F.3d at 1328.

Having considered all the evidence of record, we discern no reason to change our initial determination that a "multitude" may include two. Thus, we maintain our determination from the Decision on Institution that a "multitude" includes two (as opposed to being no fewer than three). This construction is consistent with the counsel of our reviewing court that "it seems unlikely that a claim drafter would use a term of such biblical imprecision as 'multitude' if that term were meant to have an important restrictive function in the claim." *TiVo, Inc. v. EchoStar Commc'ns Corp.*, 516 F.3d 1290, 1297 (Fed. Cir. 2008).

2. Other Terms

We determine that no other terms require explicit construction. *See, e.g.*, *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) ("[W]e need only construe terms 'that are in controversy, and only to the extent necessary to resolve the controversy' . . . ." (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

D. Obviousness Ground Based on Sakamoto

Petitioner contends the subject matter of claims 1, 4–6, 8, 10, 13, and 15 would have been obvious over Sakamoto. Pet. 8–55; Pet. Reply 10–19. Patent Owner disputes Petitioner's contentions. PO Resp. 4–17; PO Sur-reply 8–14.

1. Sakamoto

Sakamoto is a Japanese patent application publication directed to the use of a GPS positioning system that includes a portable terminal and remote server. Ex. 1004, code (57), ¶ 18. Figure 1, reproduced below, is a diagram showing a position information communication terminal.

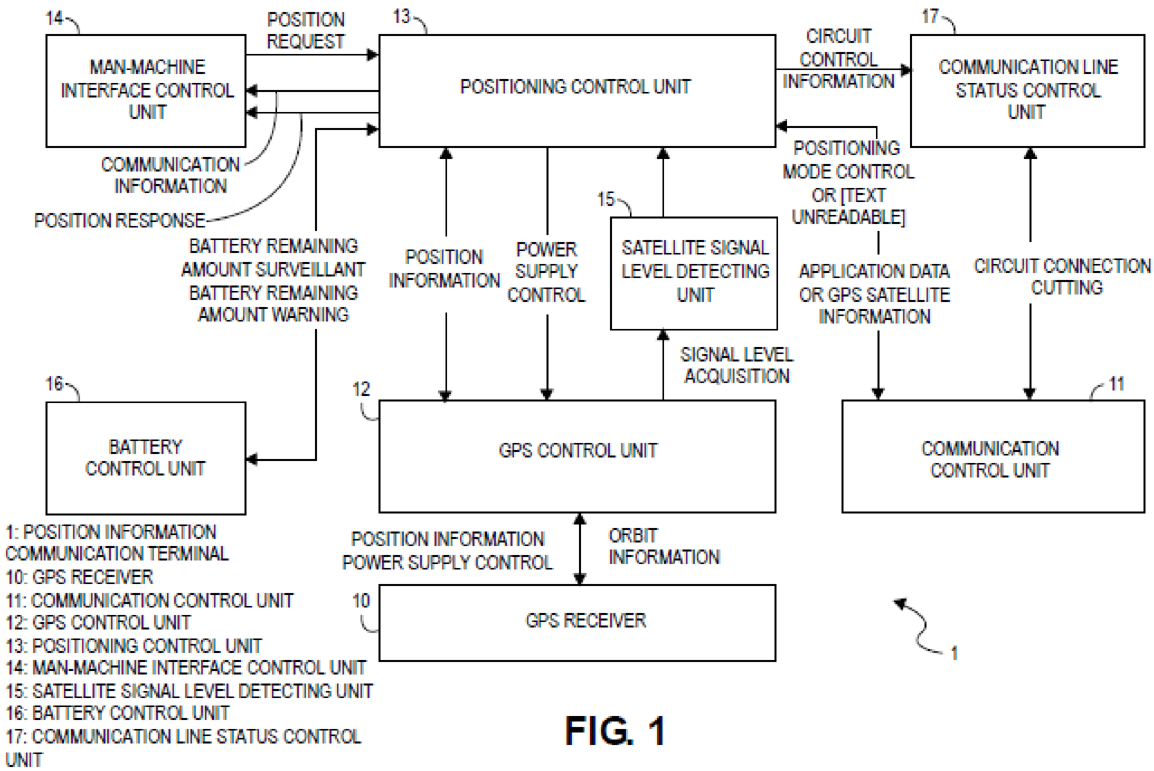

FIG. 1

Figure 1, above, depicts position information communication terminal 1, which includes GPS receiver 10, communication control unit 11 for mobile communications, GPS control unit 12, positioning control unit 13, man-machine interface control unit 14, satellite signal level detection unit 15, battery control unit 16, and communication line status control unit 17. *Id.* ¶ 19. Battery control unit 16 constantly monitors the remaining battery level. *Id.* ¶ 28. Battery control unit 16 provides positioning control unit 13 a remaining battery life warning when the remaining battery amount falls below a preset threshold value. *Id.* ¶ 19.

Satellite signal level detector 15 detects a level of the GPS signal received by GPS receiver 10 via GPS control unit 12. *Id.* When the signal level value is equal to or higher than a predetermined threshold value, positioning mode control unit 22 initiates a normal sensitivity positioning mode. *Id.* ¶ 38. Normal sensitivity positioning mode is a mode in which the

GPS receiver is operated only when necessary. *Id.* ¶¶ 4–5, 19. When the signal level value is equal to or lower than a predetermined threshold value, positioning mode control unit 22 initiates a high sensitivity positioning mode. *Id.* ¶ 38. High sensitivity positioning mode is a mode in which the GPS receiver is operated constantly. *Id.* ¶¶ 4–5, 19. When the signal level value is equal to or lower than a threshold value associated with the inability to perform positioning, positioning mode control unit 22 stops the position search. *Id.* ¶ 38. A user may select among normal sensitivity positioning mode, high sensitivity positioning mode, and the power-off of terminal 1 via man-machine interface control unit 14. *Id.* ¶¶ 26, 28.

Figure 2 of Sakamoto is reproduced below.

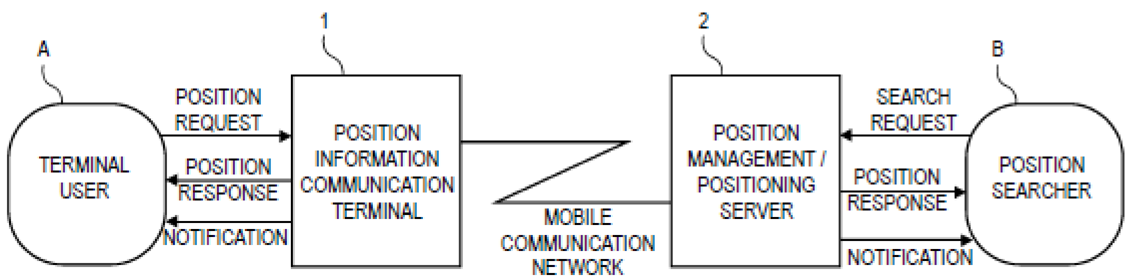

FIG. 2

Figure 2 depicts a GPS positioning system with position management/ positioning server 2 connected to position information communication terminal 1 by a mobile communication network. Ex. 1004 ¶ 18. Terminal 1 responds to a position request from terminal user A by showing the position of terminal 1 to terminal user A. *Id.* Server 2 responds to a position search request of terminal 1 from position searcher B with a position response. *Id.* Server 2 may also send a position search request message to terminal 1, and terminal 1 responds by sending a search response message including position information to server 2. *See id.* ¶¶ 31–35, Figs. 4, 5.

Petitioner contends Sakamoto qualifies as prior art under 35 U.S.C. § 102(b) based on its publication date. Pet. 7. Patent Owner does not contest the prior art status of Sakamoto. We determine that Sakamoto qualifies as prior art under 35 U.S.C. § 102(b) because Sakamoto's publication date of February 5, 2004, is more than one year before the earliest effective filing date of the challenged claims, which is April 5, 2007. Ex. 1001, code (63); Ex. 1004, code (43).

2. Claim 1

The preamble of claim 1 recites "[a] portable electronic tracking device to monitor location coordinates of one or more individuals and objects using a satellite navigation system." Ex. 1001, 15:46–48. Petitioner cites Sakamoto's position information communication terminal 1, which comprises GPS receiver 10, communication control unit 11, GPS control unit 12, position control unit 13, man-machine interface control unit 14, satellite signal level detecting unit 15, battery control unit 16 and battery, and communication line status controlling unit 17. Pet. 13 (citing Ex. 1004 ¶ 19, Fig. 1). Petitioner contends an ordinarily skilled artisan would have considered terminal 1 to be portable based on Sakamoto's teaching of using terminal 1 with a battery and a mobile communication network. *Id.* at 14–15 (citing Ex. 1003 ¶ 76; Ex. 1004 ¶¶ 3, 11, 14, 30, 31, 46). Regarding "monitor[ing] location coordinates of . . . individuals and objects using a satellite navigation system," Petitioner cites Sakamoto's GPS receiver 10 and GPS control unit 12, which allegedly "determine terminal user A's (an individual's) and terminal 1's (an object's) position." *Id.* at 15 (citing Ex. 1004 ¶¶ 18, 20–24, Fig. 2).

Patent Owner does not contest Petitioner's analysis of the preamble. Neither party addresses whether the preamble is limiting. We are persuaded that Sakamoto teaches a "portable electronic tracking device to monitor location coordinates of one or more individuals and objects using a satellite navigation system a battery with a battery charge level." *See, e.g.*, Ex. 1004 ¶¶ 3, 18–19. Because Petitioner has shown that Sakamoto teaches the preamble, we need not determine whether the preamble is limiting. *See Nidec*, 868 F.3d at 1017.

Claim 1 further recites "a battery having a battery charge level." Ex. 1001, 15:50. Petitioner cites Sakamoto's teachings of battery control unit 16 in terminal 1 that notifies "positioning control unit 13 of a remaining battery amount warning when the remaining amount value of a battery (not shown) that supplies operating power falls below a preset threshold value." Pet. 16 (quoting Ex. 1004 ¶ 19) (emphasis omitted). Petitioner also notes Sakamoto's reference that battery control unit 16 monitors "remaining battery level." *Id.* at 17 (quoting Ex. 1004 ¶ 28) (emphasis omitted). Petitioner additionally notes that "*Sakamoto's* claims include the battery in the of [sic] components of the terminal." *Id.* at 16 (citing Ex. 1004 ¶¶ 9, 10, 14, 15). Patent Owner does not contest Petitioner's analysis of this limitation. We are persuaded that Sakamoto teaches "a battery having a battery charge level." *See, e.g.*, Ex. 1004 ¶¶ 9, 10, 14, 15, 19, 28.

Claim 1 further recites "transceiver circuitry." Ex. 1001, 15:51. Petitioner cites, *inter alia*, Sakamoto's teaching of "communication control unit 11" including "mobile communication means." Pet. 18 (citing Ex. 1004 ¶¶ 19, 30). Petitioner further cites Sakamoto's teachings that communications control unit 11 transmits positioning control messages and

remaining battery amount warning messages and receives positioning control messages. *Id.* (citing Ex. 1004 ¶¶ 7, 34, 35). In light of these teachings, Petitioner contends an ordinarily skilled artisan would have known Sakamoto's communication control unit 11 to be a transceiver. *Id.* (citing Ex. 1003 ¶ 80). Patent Owner does not contest Petitioner's analysis of this limitation. We are persuaded that Sakamoto teaches transceiver circuitry. *See, e.g.*, Ex. 1003 ¶ 80; Ex. 1004 ¶¶ 7, 34, 35.

Claim 1 further recites "processor circuitry." Ex. 1001, 15:52. Petitioner cites Sakamoto's teaching of GPS receiver 10 performing "positioning operations" when it determines location coordinates from a received communication signal. Pet. 20 (citing Ex. 1004 ¶ 19, Fig. 1). Petitioner further cites Sakamoto's teaching of satellite level detecting unit 15 detecting the level of the GPS satellite signal and performing calculations based on the received signal level. *Id.* at 21 (citing Ex. 1003 ¶ 83; Ex. 1004 ¶¶ 19, 37). Patent Owner does not contest Petitioner's analysis of this limitation. We are persuaded that Sakamoto teaches processor circuitry. *See, e.g.*, Ex. 1004 ¶¶ 19, 37.

Claim 1 further recites "a battery power monitor to measure in real-time the battery charge level and to make a prediction of an estimated remaining battery charge level in response to the battery charge level." Ex. 1001, 15:53–56. Petitioner again cites Sakamoto's battery control unit 16 and notes that it "constantly" monitors a remaining battery amount in order to determine when battery power falls below a predetermined threshold. Pet. 22–24 (citing Ex. 1004 ¶¶ 19, 28, 39). Petitioner further contends an ordinarily skilled artisan would have known that monitoring the remaining battery charge amount necessarily requires an estimate based on

"conditions such as temperature and battery age." *Id.* at 24–25 (citing Ex. 1003 ¶ 85). Patent Owner does not contest Petitioner's analysis of this limitation. We are persuaded that Sakamoto's battery control unit 16 teaches the recited "battery power monitor." *See, e.g.*, Ex. 1003 ¶ 85; Ex. 1004 ¶¶ 19, 28, 39.

Claim 1 further recites:

> local battery power adjustment mechanism to generate in substantially real-time an updated set of network communication signaling protocols associated with at least one of a request rate of location coordinate packets to be communicated to a target host and a listen rate of the location coordinate packets from a satellite navigation system, the updated set of network communication signaling protocols having a value that is responsive to a user input request.

Ex. 1001, 15:57–65. For the recited "local battery power adjustment mechanism," Petitioner cites Sakamoto's man-machine interface control unit 14 and positioning control unit 13. Pet. 26–27 (citing Ex. 1004, Fig. 1). Petitioner contends these elements "act in concert to reduce (*i.e.,* 'adjust') the battery usage of *Sakamoto's* terminal." *Id.* at 27 (citing Ex. 1004 ¶ 46). Petitioner explains that a user sets a "preset threshold value" using man-machine interface control unit 14 "to specify the battery level below which the terminal will automatically switch from high sensitivity positioning mode to normal sensitivity positioning mode." *Id.* at 27–28 (citing Ex. 1004 ¶¶ 29, 46). Based on this threshold value, positioning control unit 13 switches between the high sensitivity positioning mode and the normal sensitivity positioning mode by turning on and off the GPS receiver according to the current positioning mode. *Id.* at 28 (citing Ex. 1003 ¶ 87; Ex. 1004 ¶¶ 20, 24). Petitioner contends modes are changed "substantially [in] real-time" based on Sakamoto's real-time battery monitoring and

Sakamoto's teaching of "automatically" switching modes at a preset threshold battery level. *Id.* at 29–30 (citing Ex. 1003 ¶ 88; Ex. 1004 ¶¶ 19, 29, 46). Petitioner further contends that an ordinarily skilled artisan "would have appreciated that switching the positioning mode updates the communication signaling protocol." *Id.* at 31 (citing Ex. 1003 ¶¶ 89–94); *see also id.* at 29–30 (same argument); Pet. Reply 15 (same argument).

Petitioner maps the recited "communication signal protocols" to Sakamoto's normal sensitivity positioning mode, high sensitivity positioning mode, and power-off mode. Pet. 31 (citing Ex. 1004 ¶¶ 5–10, 28). For the recited "listen rate," Petitioner notes that, after an initial position request, "high-sensitivity positioning mode keeps the GPS continuously powered on, 'constantly' updating the position of the terminal," so an ordinarily skilled artisan would have known the GPS receiver to have "an associated refresh rate of location coordinates (commonly 1Hz)." *Id.* (citing Ex. 1003 ¶ 90; Ex. 1004 ¶¶ 20, 25, 31, 36). Petitioner further notes that, in Sakamoto's normal sensitivity positioning mode, GPS receiver 10 is powered on and off in response to requests at man-machine interface control unit 14, which Petitioner characterizes as regular or irregular. *Id.* at 32–33 (citing Ex. 1003 ¶ 92; Ex. 1004 ¶¶ 24, 34). Petitioner additionally notes that Sakamoto discloses search requests made during a regular "short cycle." *Id.* at 33 (citing, *inter alia*, Ex. 1004 ¶ 40). Furthermore, Petitioner notes that even when no positioning request is pending, the server may periodically (i.e., at a "cycle set in advance") send a satellite signal level request message, which "causes the terminal to monitor the satellite signal level for a specified length of time and send a 'satellite signal level response message' with signal strength data to the server." *Id.* at 32 (citing Ex. 1004 ¶ 37). As such,

Petitioner contends an ordinarily skilled artisan would have understood that the periodic satellite signal request message cycle is "a minimum value for the listen rate of the GPS receiver in normal sensitivity position." *Id.* (citing Ex. 1003 ¶ 92). Finally, Petitioner asserts that the listen rate for GPS signals is zero when the GPS receiver is in power-off mode. *Id.* at 33–34 (citing Ex. 1003 ¶ 94; Ex. 1004 ¶¶ 28, 39, 51).

For the "request rate," Petitioner contends that search response messages in Sakamoto's normal and high sensitivity modes "are generated in response to a position search request message and as such may be generated in response to a request by a position searcher or repeatedly in a 'short cycle.'" Pet. 33 (citing Ex. 1004 ¶¶ 31–35, 40, 53). In light of this, Petitioner contends that an ordinarily skilled artisan "would have understood that the communication signaling protocol associated with normal sensitivity positioning mode has a response rate that may be irregular (based on manual searches) or regular (at a predefined cycle frequency)." *Id.* (citing Ex. 1003 ¶¶ 91–92). Petitioner also contends that an ordinarily skilled artisan would have known that the response rate for requests is zero in power-off mode "because GPS signal levels are not monitored and position searching is stopped." *Id.* at 34 (citing Ex. 1003 ¶ 94; Ex. 1004 ¶ 38). Petitioner provides a chart, reproduced below, summarizing its "request rate" and "listen rate" mappings to Sakamoto's teachings.

Communication signaling protocol	**GPS Listen Rate**	**Response Rate (to Request Rate of Location Coordinate Packets)**
High sensitivity positioning mode	Maximum GPS refresh rate (*e.g.*, 1Hz)	irregular request rate or regular "short cycle"
Normal sensitivity positioning mode	irregular request rate, regular "short cycle," or "cycle set in advance"	irregular request rate or regular "short cycle"
Power-off mode	0Hz	0Hz

Id. In this chart from the Petition, Petitioner has listed its contentions regarding the "GPS Listen Rate" and "Response Rate (to Request Rate of Location Coordinate Packets)" for Sakamoto's high and normal sensitivity modes and power-off mode. *Id.*

For the limitation that "the updated set of network communication signaling protocols hav[e] a value that is responsive to a user input request," Petitioner cites Sakamoto's teaching that "terminal user A can select the positioning mode (and therefore the value of the communication signaling protocol) using man-machine interface control unit 14." Pet. 34–35 (citing Ex. 1004 ¶ 26). Petitioner contends the "value of the communication signaling protocol" is responsive to the user's selection of either normal sensitivity positioning mode, high sensitivity positioning mode, or power-off mode. *Id.* at 35 (citing Ex. 1004 ¶ 28). Petitioner further contends that an ordinarily skilled artisan would have known the listen rate and response rate are "value[s]" associated with the communication signaling protocol. *Id.* at 36 (citing Ex. 1003 ¶¶ 92–93).

Patent Owner argues the "local battery power adjustment mechanism" limitation of claim 1 "is directed to updating a schedule of repeating events."

PO Resp. 9. In support of its argument, Patent Owner contends that "the claimed 'request rate' and 'listening rate' of independent claims 1 and 8 are parameters of 'cycle timing,' (*i.e.*, scheduling)." *Id.* at 7 (quoting Ex. 1001, Abstr., 4:37–43). Patent Owner also cites embodiments of the '774 patent where "the request rate of location coordinate packets to be communicated to a target host and the listen rate of the location coordinate packets from a satellite navigation system represent a schedule for when repeating activities occur." *Id.* at 8 (citing Ex. 1001, 12:1–18); *see also id.* at 9 (citing examples from the '774 patent related to request rate and listen rate schedules for tracking a dog, a car, and rented construction equipment). Patent Owner contrasts these disclosures from the '774 patent with Petitioner's cited teachings from Sakamoto insofar as "*Sakamoto* does not disclose a schedule of repeating events or any updating of such schedule." *Id.* at 9–10.

We do not agree with Patent Owner's arguments because they are not commensurate with the language of claim 1. In particular, claim 1 includes no requirement that the "updated set of network communication signaling protocols" must relate to schedules of repeating events or the updating of such schedules. *See* Ex. 1001, 15:57–65. "While we read claims in view of the specification, of which they are a part, we do not read limitations from the embodiments in the specification into the claims." *Hill-Rom*, 755 F.3d at 1371. Thus, Patent Owner is wrong to suggest (*see* PO Resp. 7–9) that various exemplary embodiments from the Specification of the '774 patent limit the recited "local battery power adjustment mechanism."

Patent Owner acknowledges that "*Sakamoto* may disclose three positioning modes and three associated refresh rates," but argues that "*Sakamoto* does not disclose 'an updated set' as a distinct element from the

three fixed refresh rates." PO Sur-reply 9. Patent Owner also argues that "Petitioner does not show how any of these fixed refresh rates might be generated in substantially real-time." *Id.* at 10. Patent Owner likewise argues that Petitioner has not shown how Sakamoto's "fixed refresh rates" meet the "generated in substantially real time" limitation of claim 1. *Id.*

We do not agree with Patent Owner's arguments. Petitioner relies on switching among Sakamoto's positioning modes for teaching the updated sets. Pet. 31 (citing Ex. 1004 ¶¶ 5–10, 28). Mr. Andrews testifies that an ordinarily skilled artisan "would have appreciated that switching the positioning modes (responsive to a low-power condition or to user command) changes the frequency with which *Sakamoto's* terminal transmits and receives data (*i.e.,* updates the communication signaling protocol of the terminal)." Ex. 1003 ¶ 89. Petitioner also explains how changing Sakamoto's modes changes the associated listen rate and request rate. *See* Pet. 31–34. And, as acknowledged by Patent Owner at the oral hearing, the "updated set based on the claim language would include either/or both a refresh rate and a listen rate." Tr. 39:17–18. Thus, Petitioner persuasively shows that Sakamoto teaches the recited "updated set of network communication signaling protocols."

We also are persuaded that Sakamoto's modes switch "in substantially real-time" based on Sakamoto's teaching of an "automatic shift" from high sensitivity mode to normal mode based on the battery falling below a threshold and based on Sakamoto's aim of reducing power consumption. Pet. 29–30 (quoting Ex. 1004 ¶¶ 29, 46); Ex. 1003 ¶ 88. Mr. Andrews testifies that an ordinarily skilled artisan "would have appreciated that switching the positioning modes (responsive to a low-power condition or to

user command) changes the frequency with which *Sakamoto's* terminal transmits and receives data (*i.e.,* updates the communication signaling protocol of the terminal)." Ex. 1003 ¶ 89. Against this showing, Patent Owner has not put forth any evidence to support its contention that "generat[ing] . . . an updated set" requires the generation of entirely new parameters or that such parameters cannot be taken from predetermined sets. As such, Patent Owner's position amounts to unsupported attorney argument; it does not undermine Petitioner's persuasive showing that Sakamoto teaches real-time updating of network signaling protocol sets in order to reduce power consumption via Sakamoto's mode switching. *See, e.g.*, Ex. 1003 ¶¶ 88–89; Ex. 1004 ¶¶ 28, 29, 46.

Patent Owner also argues that Sakamoto updates its positioning modes based on charge level, and that Sakamoto does not disclose a "value that is responsive to a user input request." PO Sur-reply 11. At oral argument, Patent Owner explained this argument as meaning that the "value" must be known to the user. *See* Tr. 41:22–45:4. We do not agree with Patent Owner's argument because neither the language of claim 1 nor the Specification of the '774 patent requires the "value" to be known to the user. In particular, the '774 patent states that the "[u]pdated set of network communication signaling protocols, for instance, has value (e.g., X Y Z) responsive to user input request 430." Ex. 1001, 11:41–43. With respect to the embodiment of Figure 5, the '774 patent states further that the values "X Y Z" are request rate 420, location coordinates packet 422, and listen rate 425. *Id.* at 13:1–12, Fig. 5. Yet nothing in these descriptions requires the user to know what these values are or how they change based on the user input request. The '774 patent further provides examples of "value 419" as

"a user input screen control or mouse adjustable cursor value" and states that "user input request 430 adjusts value 419 to select an appropriate update set of network communication signaling protocols to achieve a desired user defined battery operating environment." *Id.* at 11:51–53, 11:59–62. Again, the user input changes the value, but nothing in the '774 patent requires the user's knowledge of what the value is. Based on this understanding, we find that the user's selection of an operating mode in Sakamoto via man-machine interface control unit 14 (i.e., "a user input request") changes the "value" of the operating mode and/or the "value" of the request rate and listen rate associated with the selected operating mode. *See, e.g.*, Ex. 1003 ¶¶ 92–93, Ex. 1004 ¶ 28. As such, we determine that Sakamoto teaches an "updated set of network communication signaling protocols having a value that is responsive to a user input request."

Based on the entire trial record, we are persuaded that Sakamoto's normal sensitivity positioning mode, high sensitivity positioning mode, and power-off mode teach an "updated set of network communication signaling protocols." *See, e.g.*, Ex. 1004 ¶¶ 5–10, 28. Petitioner also shows that Sakamoto either teaches, or an ordinarily skilled artisan would have appreciated from Sakamoto, that each of these modes has an associated "listen rate of the location coordinate packets from a satellite navigation system." *See, e.g.*, Ex. 1003 ¶¶ 90–92, 94; Ex. 1004 ¶¶ 20, 24, 25, 28, 31, 34, 36, 37, 39, 40, 51. Petitioner likewise demonstrates that Sakamoto's normal and high sensitivity modes have an associated "request rate of location coordinate packets to be communicated to a target host." *See, e.g.*, Ex. 1003 ¶¶ 91, 92; Ex. 1004 ¶¶ 31–35, 40, 53. In addition, the user can select a preset threshold battery level using man-machine interface control

unit 14, which controls in real-time how positioning control unit 13 switches between modes (i.e., "responsive to a user input request"). *See, e.g.*, Ex. 1003 ¶¶ 87–88; Ex. 1004 ¶¶ 19, 20, 24, 29, 46. Thus, we are persuaded that Sakamoto's man-machine interface control unit 14 and positioning control unit 13 act together as a "local battery power adjustment mechanism" that generates Sakamoto's various modes. *See, e.g.*, Ex. 1004 ¶ 46, Fig. 1.

Claim 1 further recites "wherein the local battery power adjustment mechanism actives or deactivates at least one portion of the transceiver circuitry or the processor circuitry to conserve the battery charge level in response to the value." Ex. 1001, 15:66–16:2. Petitioner cites Sakamoto's teaching that positioning control unit 13 (a part of the recited "local battery power adjustment mechanism") activates and deactivates GPS receiver 10 (a portion of the recited "transceiver circuitry" and "processor circuity") via GPS control unit 12. Pet. 36–37 (citing Ex. 1004 ¶¶ 19, 20, 24, 25, 29, 36). According to Petitioner, "the purpose of deactivating GPS receiver (and reactivating it only on demand) is to conserve battery charge level." *Id.* at 37–38 (citing Ex. 1003 ¶ 95; Ex. 1004 ¶ 39). Patent Owner does not contest Petitioner's analysis of this limitation. We are persuaded that Sakamoto's positioning control unit 13 activating and deactivating GPS receiver 10 via GPS control unit 12 teaches this limitation. *See, e.g.*, Ex. 1003 ¶ 95; Ex. 1004 ¶¶ 19, 20, 24, 25, 29, 36, 39.

Based on the entire trial record, Petitioner has persuasively shown that Sakamoto teaches all limitations of claim 1 in light of the knowledge of a person of ordinary skill in the art. Thus, we determine Petitioner has shown

by a preponderance of the evidence that the subject matter of claim 1 would have been obvious over Sakamoto.

3. Claim 4

Claim 4 depends from claim 1 and recites that "the local battery power adjustment mechanism comprises a user adjustable electronic display that indicates a current level of battery power and allows a user a capability to adjust power level thereof." Ex. 1001, 16:18–21. As discussed above, Petitioner maps the "local battery power adjustment mechanism" recited in claim 1 to Sakamoto's man-machine interface control unit 14 and positioning control unit 13. *See supra* § II.D.2. For the "user adjustable electronic display," Petitioner cites Sakamoto's teaching that a "display unit [is] provided in the man-machine interface control unit 14." Pet. 39 (quoting Ex. 1004 ¶ 13) (emphasis omitted). Petitioner further cites Sakamoto's teaching of position control unit 13 "issu[ing] a remaining battery amount warning notification to the terminal user A via the man-machine interface control unit 14." *Id.* (quoting Ex. 1004 ¶ 28). Petitioner contends that an ordinarily skilled artisan "would have understood that this remaining battery amount warning notification would have been 'issue[d]' on the display of man-machine interface control unit 14." *Id.* (citing Ex. 1003 ¶ 96; Ex. 1004 ¶ 6). For "allow[ing] a user a capability to adjust power level," Petitioner cites Sakamoto's teachings of a user adjusting a power level of the terminal by selecting a positioning mode and by changing the battery threshold at which the device automatically switches from high to normal sensitivity positioning mode. *Id.* at 40 (citing Ex. 1004 ¶¶ 28–29).

Patent Owner relies on the same arguments discussed above with respect to claim 1. We are persuaded that Sakamoto teaches a display in man-machine interface control unit 14 that is used to present battery warning notifications to a user. *See, e.g.*, Ex. 1004 ¶¶ 6, 13, 28. We also are persuaded that the display in man-machine interface control unit 14 allows the user to adjust the power level by selecting modes and by allowing the user to set a battery power threshold for automatic battery conservation. *See, e.g.*, Ex. 1004 ¶¶ 28–29. Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 4 would have been obvious over Sakamoto.

4. Claim 5

Claim 5 depends from claim 4 and recites that

> the local battery power adjustment mechanism comprises an automatic sleep mode to set at least one of the request rate of the location coordinate packets to the target host and the listen rate of the location coordinates from the satellite navigation system to a minimal level until the battery power monitor measures a sustainable battery charge level to process the at least one portion of an receive signal.

Ex. 1001, 16:22–29. For the "automatic sleep mode," Petitioner cites Sakamoto's teaching of "turning off the power of the GPS receiver so that longer operating time can be achieved." Pet. 41 (quoting Ex. 1004 ¶ 51). Petitioner contends this would result in a listen rate of zero, which is a "minimal level." *Id.* (citing Ex. 1003 ¶ 94). For the recited condition "until the battery power monitor measures a sustainable battery charge level to process the at least one portion of an receive signal," Petitioner cites Sakamoto's teaching that "the terminal side can recognize that the remaining

battery level is low and can cope with the charging of the battery." *Id.* (quoting Ex. 1004 ¶ 47). Petitioner contends an ordinarily skilled artisan

> would have recognized that this "coping" with the battery being charged would have included switching the positioning mode back to normal sensitivity positioning mode or high sensitivity positioning mode once the remaining battery level was no longer below the threshold that caused the terminal to switch to power off mode.

Id. at 40–41 (citing Ex. 1003 ¶ 97).

Patent Owner relies on the same arguments discussed above with respect to claim 1. We are persuaded that Sakamoto teaches the recited "automatic sleep mode." *See, e.g.*, Ex. 1004 ¶ 51. We also are persuaded by Mr. Andrews's uncontested testimony that an ordinarily skilled artisan would have known that Sakamoto's system switches back to normal or high sensitivity positioning mode once battery power has been replenished based on Sakamoto's teaching of the terminal "cop[ing] with the charging of the battery." *See, e.g.*, Ex. 1003 ¶ 97; Ex. 1004 ¶ 47. Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 5 would have been obvious over Sakamoto.

5. Claim 6

Claim 6 depends from claim 4 and recites that

> the local battery power adjustment mechanism comprises a charge control management of the portable electronic tracking device that estimates charge capability and adjusts cycling of the at least one of a request rate of location coordinate packets to a target host and a listen rate of the location coordinate packets from the satellite navigation system to maximize charge capability.

Ex. 1001, 16:30–36. For "charge control management . . . that estimates charge capability," Petitioner cites Sakamoto's teaching that positioning control unit 13 receives a "battery remaining amount" from battery control unit 16. Pet. 42–43 (citing Ex. 1004, Fig. 1). Petitioner also cites Sakamoto's teaching of positioning control unit 13 automatically shifting to normal sensitivity positioning mode based on a remaining battery amount warning. *Id.* at 43–44 (citing Ex. 1004 ¶ 29). For "adjust[ing] cycling," Petitioner contends that "[c]hanging the positioning mode adjusts the cycling of request rate and the listen rate." *Id.* at 44 (citing Ex. 1003 ¶ 98). Petitioner contends this mode switch is performed in order to reduce the power consumption and extend operating time, which meets the "maximize charge capability" limitation of claim 6. *Id.* (citing Ex. 1004 ¶ 46).

Patent Owner relies on the same arguments discussed above with respect to claim 1. We are persuaded that Sakamoto's positioning control unit 13 (i.e., part of the "local battery power adjustment mechanism") receives remaining battery amount information and shifts operating modes to adjust request rate and listen rate cycling. *See, e.g.*, Ex. 1003 ¶ 98; Ex. 1004 ¶ 29, Fig. 1. This "maximiz[es] charge capacity" by reducing power consumption. *See, e.g.*, Ex. 1004 ¶ 46. Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 6 would have been obvious over Sakamoto.

6. Claim 8

Independent claim 8 recites "[a] local charging management device to manage electrical resource capability for an electronic tracking device that is tracked by at least one other tracking device." Ex. 1001, 16:43–45. For the

"local charging management device," Petitioner cites Sakamoto's battery, battery control unit 16, positioning control unit 13, and GPS control unit 12. Pet. 44. Petitioner maps the "electronic tracking device" to Sakamoto's GPS receiver 10, communication control unit 11, GPS control unit 12, position control unit 13, man-machine interface control unit 14, satellite signal level detecting unit 15, battery control unit 16 and battery, and communication line status controlling unit 17. *Id*. at 13 (citing Ex. 1004 ¶ 19, Fig. 1), 44–45. For "track[ing] by at least one other tracking device," Petitioner contends the "electronic tracking device" is tracked by position management server 2. *Id.* at 44–45; *see also id.* at 15–16 (analyzing similar limitation in claim 1).

Patent Owner does not contest Petitioner's analysis of the preamble. Neither party addresses whether the preamble is limiting. We are persuaded that Sakamoto teaches a "local charging management device to manage electrical resource capability for an electronic tracking device that is tracked by at least one other tracking device." *See, e.g.*, Ex. 1004 ¶¶ 3, 18–24, Fig. 1. Because Petitioner has shown that Sakamoto teaches the preamble, we need not determine whether the preamble is limiting. *See Nidec*, 868 F.3d at 1017.

Claim 8 further recites "a battery power level monitor." Ex. 1001, 16:46. Petitioner maps this limitation to Sakamoto's battery control unit 16 and GPS control unit 12 and relies on its analysis of the "battery power monitor" limitation of claim 1. Pet. 22–25, 45–46 (citing Ex. 1004, Fig. 1). Notwithstanding, Petitioner notes that its mapping is slightly different compared to the "battery power monitor" of claim 1 due to added functionality (discussed below) recited in claim 8. *Id.* at 45 n.5. Patent

Owner does not contest Petitioner's analysis of this limitation. Based on Petitioner's analysis from claim 1, we are persuaded that Sakamoto's battery control unit 16 and GPS control unit 12 teach the recited "battery power level monitor." *See, e.g.*, Ex. 1004 ¶¶ 19, 28, 39, Fig. 1.

Claim 8 further recites "a charging unit." Ex. 1001, 16:47. Petitioner cites the same analysis from claim 1 for the "battery having a battery charge level" limitation. Pet. 46. Patent Owner does not contest Petitioner's analysis of this limitation. Based on Petitioner's analysis from claim 1, we are persuaded that Sakamoto teaches "a charging unit." *See, e.g.*, Ex. 1004 ¶¶ 9, 10, 14, 15, 19, 28.

Claim 8 recites "an electrical power resource management component to adjust cycle timing of at least one of a request rate of location coordinate packets to a target host and a listen rate of the location coordinate packets responsive to an estimated charge level of the charging unit." Ex. 1001, 16:48–52. According to Petitioner, the '774 patent states that a local battery adjustment mechanism is one example of an "electrical resource management component." Pet. 46 (citing Ex. 1001, 13:13–15). As such, Petitioner cites its analysis from the "local battery power adjustment mechanism" limitation of claim 1. *Id.* Petitioner contends that the same analysis related to Sakamoto's switching of positioning modes teaches "adjust[ing] cycle timing." *See* Pet. 46–47.

Patent Owner argues that "*Sakamoto's* transitioning between positioning modes and corresponding different refresh rates . . . does not disclose '**adjust** cycle timing of at least one of a request rate . . . and a listen rate'" because Sakamoto merely teaches "changing from one refresh rate to a completely different refresh rate." PO Sur-reply 12. We do not agree with

Patent Owner's argument for the same reasons discussed above with respect to claim 1. We find that Sakamoto's changing of refresh rates—which is acknowledged by Patent Owner (*id.*)—teaches adjusting the cycle timing. Patent Owner also disputes Petitioner's analysis to the extent that Sakamoto's positioning modes do not disclose a schedule of repeating events or any updating of such schedule. *See* PO Resp. 10–12. Again, however, claim 8 does not require any such schedule, and we decline to read in a schedule requirement from the exemplary embodiments of the '774 patent. Thus, we do not agree with Patent Owner's argument.

As above, we are persuaded by Petitioner's contentions (Pet. 47) that Sakamoto teaches "adjust[ing] . . . cycle rates (by switching positioning mode and therefore updating the communication signaling protocol) responsive to an estimated charge level (remaining battery amount) of the charging unit (battery)." *See, e.g.*, Ex. 1003 ¶¶ 98, 102; Ex. 1004 ¶¶ 5–10, 28, 29.

Claim 8 further recites

> wherein the battery power level monitor measures a power level of the charging unit and adjusts a power level applied to location tracking circuitry responsive to one or more signal levels, the power level comprising a multitude of threshold values determined by a user or system administrator to intermittently activate or deactivate the location tracking circuitry to conserve power of the charging unit in response to the estimated charge level of the charging unit.

Ex. 1001, 16:53–61. Petitioner's analysis of the "measures a power level of the charging unit" limitation is similar to that of claim 1; Petitioner contends "*Sakamoto* teaches battery control unit 16 measures a power level of the battery." Pet. 48 (citing Ex. 1003 ¶ 101); *see also id.* at 23–24 (citing Ex. 1004 ¶¶ 28, 39). For "adjust[ing] a power level applied to location

tracking circuitry," Petitioner cites Sakamoto's teaching of changing the power level applied to GPS receiver 10 depending on positioning mode. *Id.* at 48–49 (citing Ex. 1004 ¶¶ 24, 25). Petitioner contends the adjustment to GPS receiver 10 is "responsive to one or more signal levels" based on Sakamoto's detection of GPS satellite signal levels and teachings of (1) threshold K1, below which positioning control unit 13 automatically transitions to high sensitivity positioning mode; and (2) threshold K2, above which positioning control unit 13 automatically transitions to normal sensitivity positioning mode. *Id.* at 49–50 (citing Ex. 1004 ¶ 27).

For the recited "multitude of threshold values," Petitioner cites Sakamoto's teachings of two battery power level thresholds related to (1) the user-defined battery power level threshold below which the mode switches from high sensitivity positioning mode to normal sensitivity positioning mode; and (2) "a still lower-power mode whereby the GPS receiver is completely shut down." Pet. 50–51 (citing Ex. 1004 ¶¶ 29, 39, 51). Regarding the "still-lower power mode," Petitioner contends an ordinarily skilled artisan "would have understood these teachings of *Sakamoto* to indicate a second battery threshold below which this complete GPS power off occurs." *Id.* at 51 (citing Ex. 1003 ¶ 103).

Patent Owner argues that Petitioner's two cited thresholds from Sakamoto cannot teach the recited "multitude of threshold values." PO Resp. 12–17. Patent Owner's arguments turn on the construction of the term "multitude." We have considered Patent Owner's arguments regarding this term, and, as discussed above, we interpret the word "multitude" to include two. *See supra* § II.C. Thus, Petitioner's two cited power level thresholds from Sakamoto (i.e., the battery power level thresholds triggering shifts

between (1) high sensitivity and normal mode; and (2) normal mode and power-off mode) teach the recited "multitude of threshold values" under this interpretation. *See, e.g.*, Ex. 1003 ¶ 103; Ex. 1004 ¶¶ 29, 39, 51.

Patent Owner does not otherwise contest Petitioner's analysis of this limitation. We are persuaded that Sakamoto teaches measuring a power level of the battery (*see, e.g.*, Ex. 1004 ¶¶ 28, 39), adjusting a power level applied to GPS receiver 10 (*see, e.g.*, Ex. 1004 ¶¶ 24, 25), and making the adjustment to GPS receiver 10 responsive to a comparison with Sakamoto's GPS satellite signal level thresholds K1 and K2 (*see, e.g.*, Ex. 1004 ¶ 27).

Based on the entire trial record, Petitioner has persuasively shown that Sakamoto teaches all limitations of claim 8 in light of the knowledge of a person of ordinary skill in the art. Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 8 would have been obvious over Sakamoto.

7. Claim 10

Claim 10 depends from claim 8 and recites a limitation similar to that of claim 6. Ex. 1001, 17:4–10. Petitioner relies on the same analysis from claim 6. Pet. 54. Patent Owner relies on the same arguments from claim 8. PO Resp. 12–17; PO Sur-reply 14. For the same reasons discussed above for claim 6 (*see supra* § II.D.5), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 10 would have been obvious over Sakamoto.

8. Claim 13

Claim 13 depends from claim 8 and recites that "the listen rate of the location coordinates comprises a global positioning system (GPS) system refresh rate of the location coordinates." Ex. 1001, 17:23–25. Petitioner cites its analysis from claim 1 and contends that "*Sakamoto's* listen rate of location coordinates is a GPS system refresh rate of location coordinates." Pet. 54 (citing Ex. 1003 ¶ 108); *see also id.* at 31–32 (Petitioner's analysis of Sakamoto's high sensitivity positioning mode and of how "a continuously operating GPS receiver has an associated refresh rate of location coordinates"). Patent Owner relies on the same arguments from claim 8. PO Resp. 12–17; PO Sur-reply 14. For the same reasons discussed above for claim 1 (*see supra* § II.D.2), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 13 would have been obvious over Sakamoto.

9. Claim 15

Claim 15 depends from claim 8 and recites that "the battery power level monitor measures a power level of the charging unit and substantially automatically adjusts power usage responsive to available power of the charging unit to maximize power unit life." Ex. 1001, 17:29–33. For "measur[ing] a power level of the charging unit," Petitioner cites Sakamoto's teaching that battery control unit 16 monitors a remaining battery amount in order to determine when battery power falls below a predetermined threshold. Pet. 22 (citing Ex. 1004 ¶¶ 19, 28), 54. Regarding the recited adjustment to power usage, Petitioner cites Sakamoto's teaching of automatically changing from high to normal sensitivity power mode

based on a notification sent when battery control unit 16 detects that the battery level is lower than a predetermined threshold. *Id.* at 54–55 (citing Ex. 1004 ¶¶ 29, 46). Petitioner contends an ordinarily skilled artisan "would have understood that this would have the purpose (and the effect) of increasing (maximize) the battery (power unit) life." *Id.* at 55 (citing Ex. 1003 ¶ 109).

Patent Owner relies on the same arguments discussed above with respect to claim 8. PO Resp. 12–17; PO Sur-reply 14. We are persuaded that Sakamoto's battery control unit 16 monitors a remaining battery amount and notifies positioning control unit 13 when appropriate to switch modes and maximize the life of the battery. *See, e.g.*, Ex. 1004 ¶¶ 19, 28, 29, 46. Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 15 would have been obvious over Sakamoto.

E. Obviousness Ground Based on Sakamoto and AAPA

Petitioner contends the subject matter of claims 1, 4–6, 8, 10, 13, and 15 would have been obvious over the combination of Sakamoto and AAPA. Pet. 56–60. As discussed above, Petitioner has demonstrated that the subject matter of claims 1, 4–6, 8, 10, 13, and 15 would have been obvious over Sakamoto, so we do not reach the ground based on Sakamoto and AAPA. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1359 (2018) (holding a petitioner "is entitled to a final written decision addressing all of the claims it has challenged"); *Boston Sci. Scimed, Inc. v. Cook Grp. Inc.*, 809 F. App'x 984, 990 (Fed. Cir. 2020) (non-precedential) (recognizing that the "Board need not address issues that are not necessary to the resolution of the

proceeding" and, thus, agreeing that the Board has "discretion to decline to decide additional instituted grounds once the petitioner has prevailed on all its challenged claims").

F. Obviousness Ground Based on Sakamoto and Hayasaka

Petitioner contends the subject matter of claims 1, 4–6, 8, 10, 13, and 15 would have been obvious over Sakamoto and Hayasaka. Pet. 60–71. We already have found claims 1, 4–6, 8, 10, 13, and 15 to be unpatentable over Sakamoto, so we do not reach the ground based on Sakamoto and Hayasaka. *See SAS*, 138 S. Ct. at 1359; *Boston Sci.*, 809 F. App'x at 990.

III. PATENT OWNER'S MOTION TO AMEND

Pursuant to 35 U.S.C. § 316(d)(1) and 37 C.F.R. § 42.121(a), Patent Owner moves to replace claims 1, 4–6, 8, 10, 13, and 15 of the '774 patent with proposed substitute claims 20, 23–25, 27, 29, 32, and 34, respectively. MTA 1; MTA Reply 1. The motion is contingent on our determination as to whether a preponderance of the evidence establishes that claims 1, 4–6, 8, 10, 13, and 15 of the '774 patent are unpatentable. MTA 1. As discussed above, we determine that original claims 1, 4–6, 8, 10, 13, and 15 of the '774 patent have been shown to be unpatentable by a preponderance of the evidence. *See supra* § II.D.2–9. Therefore, we proceed to address Patent Owner's motion to amend.

A. Proposed Substitute Claims

Independent proposed substitute claims 20 and 27, which are illustrative of the proposed substitute claims, are reproduced below with underlining to indicate added text and strikethrough to indicate deleted text.

20. A portable electronic tracking device to monitor location coordinates of one or more individuals and objects using a satellite navigation system, the portable electronic tracking device comprising:

a battery having a battery charge level;

transceiver circuitry;

processor circuitry;

a battery power monitor to measure in real-time the battery charge level and to make a prediction of an estimated remaining battery charge level in response to the battery charge level; <u>and</u>

local battery power adjustment mechanism to generate in substantially real-time an updated set of network communication signaling protocols associated with at least one of a request rate <u>representing a repeating time interval for</u> ~~of~~ location coordinate packets to be communicated to a target host and a listen rate <u>representing a repeating time interval for receipt</u> of the location coordinate packets from a satellite navigation system, the updated set of network communication signaling protocols having a value that is responsive to a user input request <u>and representing a timing schedule for at least one of the request rate and the listen rate</u>;

wherein the local battery power adjustment mechanism actives or deactivates at least one portion of the transceiver circuitry or the processor circuitry to conserve the battery charge level in response to the value.

27. A local charging management device to manage electrical resource capability for an electronic tracking device that is tracked by at least one other tracking device comprising:

> a battery power level monitor;
>
> a charging unit; and
>
> an electrical power resource management component to adjust cycle timing of at least one of a request rate representing a repeating time interval for transmission of location coordinate packets to a target host and a listen rate representing a repeating time interval for receipt of the location coordinate packets responsive to an estimated charge level of the charging unit, the cycle timing representing a timing schedule for at least one of the request rate and the listen rate,
>
> wherein the battery power level monitor measures a power level of the charging unit and adjusts a power level applied to location tracking circuitry responsive to one or more signal levels, the power level comprising a multitude of threshold values determined by a user or system administrator to intermittently activate or deactivate the location tracking circuitry to conserve power of the charging unit in response to the estimated charge level of the charging unit.

MTA 25–26, 28–29.

B. Procedural Requirements

"Before considering the patentability of any substitute claims, . . . the Board first must determine whether the motion to amend meets the statutory and regulatory requirements set forth in 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121." *Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 15, 4–8 (PTAB Feb. 25, 2019) (precedential). Patent Owner bears the burden of proving these requirements by a preponderance of the evidence. 37 C.F.R. § 42.121(d)(1).

1. Claim Listing

The motion to amend includes a claim listing that clearly shows the changes, as required by 37 C.F.R. § 42.121(b). *See* MTA 25–30; *Lectrosonics*, Paper 15 at 8.

2. Reasonable Number of Substitute Claims

We now consider whether the motion to amend proposes a reasonable number of substitute claims. 35 U.S.C. § 316(d)(1)(B). "There is a rebuttable presumption that a reasonable number of substitute claims per challenged claim is one (1) substitute claim." *Lectrosonics*, Paper 15 at 4–5 (citing 37 C.F.R. § 42.121(a)(3)). Patent Owner's motion originally proposed 15 substitute claims, including 8 proposed substitute claims corresponding to claims challenged in this *inter partes* review and 7 proposed substitute claims corresponding to dependent claims that are not challenged here. MTA 25–30. In our Preliminary Guidance, we indicated that "Section 316(d) does not permit Patent Owner to cancel or propose substitutes for non-challenged claims," so we would "only consider the Motion with respect to the proposed substitute claims that correspond to the challenged claims." PG 3–4. Patent Owner acknowledged this in its reply and now agrees that "only corresponding proposed substitute claims 20, 23–25, 27, 29, 32, and 34 are to be considered in relation to Patent Owner's Motion to Amend." MTA Reply 1. As such, the Petition challenges 8 claims, and the motion to amend proposes 8 substitute claims. *Id.* We determine that the number of proposed substitute claims is reasonable.

3. Respond to a Ground of Unpatentability Involved in the Trial

Next, we consider whether the proposed substitute claims respond to a ground of unpatentability involved in this trial. *Lectrosonics*, Paper 15 at 5–6 (citing 37 C.F.R. § 42.121(a)(2)(i)). Patent Owner characterizes its amendments as adding the following limitations to the original claims:

> (1) that request rate represents a repeating time interval for location coordinate packets to be communicated to a target host in proposed substitute independent claims 20 and 27; (2) that listen rate represents a repeating time interval for receipt of the location coordinate packets in proposed substitute independent claims 20 and 27; (3) that the updated set of network communication signaling protocols represent a timing schedule for at least one of the request rate and the listen rate in proposed substitute independent claim 20; and (4) that the cycle timing represents a timing schedule for at least one of the request rate and the listen rate in proposed substitute independent claim 27.

MTA 2–3. Patent Owner highlights these added limitations in asserting that that the proposed substitute claims are patentable over the references in the instituted grounds. *See id.* at 3–4. Petitioner does not argue otherwise. Based on Patent Owner's showing, we determine that the amended language in the proposed substitute claims is responsive to the grounds of unpatentability involved in this trial.

4. No Enlargement to the Scope of the Claims

We also consider the breadth of the proposed substitute claims. "A motion to amend may not present substitute claims that enlarge the scope of the claims of the challenged patent or introduce new subject matter." *Lectrosonics*, Paper 15 at 6–7 (citing 35 U.S.C. § 316(d)(3); 37 C.F.R. § 41.121(a)(2)(ii)). For the independent proposed substitute claims, Patent Owner's proposed amendments add several limitations, including the ones

highlighted directly above. Based on the added limitations, Patent Owner contends that the proposed substitute claims do not enlarge the scope of any original claim. MTA 3.

Petitioner contends that proposed substitute claims 20, 23–25, 27, 29, 32, and 34 impermissibly attempt to broaden the scope of corresponding original claims 1, 4–6, 8, 10, 13, and 15. MTA Opp. 3. Specifically, Petitioner contends that proposed substitute claims 20 and 27 require "an updated set of network communication signaling protocols associated with at least one of a request rate <u>representing a repeating time interval for</u> [[of]] location coordinate packets to be communicated to a target host and a listen rate <u>representing a repeating time interval for receipt</u> of the location coordinate packets from a satellite navigation system," where corresponding original claims 1 and 8 require that the request rate and listen rate actually be *for* the corresponding packets. *Id.* (alteration in original) (citing MTA 25–26). According to Petitioner, a system where a refresh rate merely "represent[s]" (but does not include) an actual transmission or reception rate for a corresponding type of packet would satisfy proposed substitute claims 20 and 27, but would not satisfy corresponding original claims 1 and 8. *Id.* at 3–4.

Proposed substitute claims 20 and 27 require that the recited "request rate" and "listen rate" represent "<u>a repeating timing interval</u>." Corresponding original claims 1 and 8 do not recite such a requirement, so these proposed amendments represent a narrowing of the claims. We do not agree with Petitioner's argument that the use of word "representing" in the proposed amendments acts to broaden the proposed substitute claims. Petitioner's argument is premised on the notion that the word "of" in the

challenged claims means "includes." *See* MTA Opp. 3–4. But Petitioner does not support its argument with any record evidence, and we are not persuaded that the word "representing" meaningfully changes the scope of the proposed substitute claims compared to the word "of" in the original claims. Petitioner's argument also does not account for the narrowing of claim scope caused by the added "repeating time interval" limitations. Thus, we determine that the limitations added by Patent Owner result in claims that are narrower than the original claims.

5. No New Matter

We now consider whether proposed substitute claims 20, 23–25, 27, 29, 32, and 34 have introduced new matter. "[T]he Board requires that a motion to amend set forth written description support in the originally filed disclosure of the subject patent for each proposed substitute claim, and also set forth support in an earlier filed disclosure for each claim for which benefit of the filing date of the earlier filed disclosure is sought." *Lectrosonics*, Paper 15 at 7 (citing 37 C.F.R. § 42.121(b)(1)–(2)). For this requirement, Patent Owner must cite "to the *original disclosure of the application*, as filed, rather than to the patent as issued." *Id.* at 8 (emphasis added). In this case, the original disclosure is the '451 application. Ex. 1001, code (21).

Nevertheless, in its motion to amend, Patent Owner cites the published version of the '451 application, U.S. Patent Application Publication No. 2009/0189807 A1 ("the '807 publication"), to show support for the proposed substitute claims. *See* MTA 4–16 (citing Ex. 2013); Ex. 2013 (the '807 publication). In our Preliminary Guidance, we noted that

Patent Owner was required to cite the ’451 application. PG 6 (citing *Lectrosonics* for the proposition that a motion to amend must set forth written description support in the originally filed disclosure of the subject patent). Patent Owner responded by filing a copy of the ’451 application with its reply in support of the motion to amend. *See* Ex. 2017. Patent Owner’s reply also included some citations to the ’451 application as part of Patent Owner’s arguments that various amendments are supported by the original disclosure document. *See* MTA Reply 2–5.

Via its belated references to the ’451 application, Patent Owner has complied, to some degree, with the requirement from *Lectrosonics* that its motion set forth written description support in the original disclosure document. And, even to the extent Patent Owner’s only citations in the record are made to the ’807 publication, we find the ’807 publication to be substantially identical to the ’451 application. Moreover, Petitioner does not base any of its arguments on potential differences between the publication and the original application. Thus, under the particular circumstances of this case, we determine that any error Patent Owner made is harmless and decline to deny Patent Owner’s motion to amend for failure to comply with the original disclosure requirement of *Lectrosonics*. Hereinafter, we refer to the ’451 application when discussing written description arguments. We turn now to those arguments.

Petitioner contends that Patent Owner has not shown that the ’451 application adequately supports “a request rate <u>representing a repeating time interval for</u> ~~of~~ location coordination packets to be communicated to a target host and a listen rate <u>representing a repeating time interval for receipt</u> of the location coordinate packets from a satellite navigation system,” as

recited in proposed substitute claim 20 and similarly recited in proposed substitute claim 27. MTA Opp. 5. Specifically, Petitioner argues that neither the word "represent" nor any variation thereof appears in the '451 application. *Id.* Petitioner also argues that there is no disclosure in the '451 application of any "time interval" that repeats, and the word "repeating" only appears in the Specification in the context of a repeatedly tapping Morse code to generate a distress signal. *Id.* (citing Ex. 1001, 9:58–62). Petitioner additionally argues that there is no disclosure of how a "rate" that "represents" a "time interval," repeating or otherwise, is in any way different from any other rate disclosed in the '451 application. *Id.* Petitioner further argues that the paragraphs cited by Patent Owner in its motion to amend (i.e., paragraphs 53, 64, 65, and 66 of the '807 publication[8]) merely describe that a communication protocol has an associated request rate or listen rate that may be specified by a frequency or an interval, and do not provide adequate written description support for a rate "representing a repeating time interval." *Id.* at 5–6.

In reply, Patent Owner cites the '451 application as disclosing that "portable tracking device 402 adjusts settings (an internal time schedule)" and "checks internal time schedule to determine if it should listen for (perform a location lookup of) location coordinates 422 from satellite navigation system 403." MTA Reply 2 (quoting Ex. 2017, 18:7–12). Patent Owner also cites various examples in the '451 application related to request rate and listen rate schedules for tracking a dog, a car, and rented construction equipment. *Id.* (citing Ex. 2017, 21:8–22:16).

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[8] These paragraphs correspond to page 17, lines 12–21, and page 21, line 8 to page 22, line 16 in the '451 application. *See* Ex. 2017.

Based on our understanding of this limitation (*see infra* § III.C), we do not agree with Petitioner's arguments. Regarding the request rate and listen rate, the '451 application discloses that the "updated set of network communication signaling protocols . . . includes an update rate (e.g., refresh rate) of location coordinate packets 446." Ex. 2017, 17:14–16. In turn, "the update rate of location coordinate packets 446 includes request rate 420 of location coordinate packets 422 by target host 452 . . . and/or listen rate 425 of location coordinate packets 422 by portable electronic tracking device 402." *Id.* at 17:16–19. Regarding the repeating time interval, the '451 application discloses that "[i]n response to receipt of updated set of network communication signaling protocols, portable location tracking device 402 adjusts settings (an internal time schedule)" and "[p]ortable location tracking device 402 checks internal time schedule to determine if it should listen for (perform a location lookup of) location coordinates 422 from satellite navigation system 403." *Id.* at 18:7–15. Further, the '451 application describes examples of update rate intervals (in minutes) for tracking a dog, a car, and rented construction equipment that constitute the repeating time intervals for the request rate and/or listen rate. *See id.* at 21:8–22:16. In light of these disclosures, we determine that the '451 application adequately supports "a request rate representing a repeating time interval for ~~of~~ location coordination packets to be communicated to a target host and a listen rate representing a repeating time interval for receipt of the location coordinate packets from a satellite navigation system," as recited in proposed substitute claim 20 and similarly recited in proposed substitute claim 27.

For these reasons, and considering Patent Owner's evidence of support in the '807 publication and the '451 application, we determine that Patent Owner has shown adequate written description support for proposed substitute claims 20, 23–25, 27, 29, 32, and 34.

6. Conclusion Regarding Procedural Requirements

In view of the above, we determine that Patent Owner has shown, by a preponderance of the evidence, that its motion to amend meets all of the statutory and regulatory requirements of 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121. We now proceed to consider whether Petitioner has met its burden of persuasion with respect to patentability. 37 C.F.R. § 42.121(d)(2).

C. Claim Interpretation

Patent Owner puts forth a claim construction for the following limitation in proposed substitute claim 20:

> at least one of a request rate <u>representing a repeating time interval for</u> ~~of~~ location coordinate packets to be communicated to a target host and a listen rate <u>representing a repeating time interval for receipt</u> of the location coordinate packets from a satellite navigation system, the updated set of network communication signaling protocols . . . <u>representing a timing schedule for at least one of the request rate and the listen rate</u>.

MTA 16–17. Patent Owner contends this limitation requires that "the intervals represented by the request rate and the listen rate, as part of the updated set of network communication signaling protocols, represent a timing schedule for when the events occur." *Id.* at 17. Patent Owner contends this construction is consistent with the proposed claim language itself and with the Specification; in support of this contention, Patent Owner

reproduces block quotations of portion of the proposed claim language and an excerpt from the Specification, but Patent Owner does not explain how these block quotations support its contention. *Id.* at 17–19 (quoting MTA 25; Ex. 1001, 12:1–18). Patent Owner also states that the same construction should apply to the similar language in proposed substitute claim 27. *Id.* at 17.

Petitioner disputes Patent Owner's proposed construction insofar as it "requires that the schedule indicate 'when'—rather than 'how often'—the events occur." MTA Opp. 2. In support of this argument, Petitioner notes that the Specification of the '774 patent states that "refresh rate 446" is one example of a schedule. *Id.* (citing Ex. 1001, 12:59–60). Petitioner further notes that refresh rate 446 is shown to be a time interval (i.e., "10 min") in Figure 4. *Id.* (citing Ex. 1001, Fig. 4). Petitioner additionally notes that the '774 patent describes time intervals in minutes as exemplary schedules for tracking a dog, a car, and rented construction equipment. *Id.* at 2–3 (citing Ex. 1001, 14:1–57). As such, Petitioner contends that a "timing schedule" does not require an indication of *when* an event should occur. *Id.* at 3.

We agree with Petitioner that the Specification of the '774 patent includes several examples where a "timing schedule" is indicated with time intervals denominated in minutes. *See* Ex. 1001, 14:1–57, Fig. 4. We additionally agree that a refresh rate is given as an example of a timing schedule in the Specification. *Id.* at 12:57–62 (describing an exemplary "timing schedule (e.g., refresh rate 446) to maximize effectiveness of request rate 420 and listen rate 425 in response to substantially real-time measured velocity of travel of portable electronic tracking device 402"). For these reasons, we reject Patent Owner's contention (MTA 17) that the recited

"timing schedule" must include an indication of *when* an event must occur. Instead, we apply the plain and ordinary meaning to this limitation and note that time intervals (e.g., refresh rates) in minutes are described as exemplary timing schedules in the Specification of the '774 patent.

Accordingly, we determine that no terms of the proposed substitute claims require explicit construction. *See Nidec*, 868 F.3d at 1017; *Vivid*, 200 F.3d at 803.

D. Whether the Proposed Substitute Claims Are Unpatentable Under 35 U.S.C. § 112 ¶ 1

Petitioner contends that proposed substitute claims 20, 23–25, 27, 29, 32, and 34 are unpatentable under 35 U.S.C. § 112 ¶ 1 for failing to satisfy the written description requirement. MTA Opp. 4–6. The parties' arguments for this issue are the same as discussed above with respect to the new matter analysis. *See supra* § III.B.5. Thus, for the same reasons discussed above, we determine that Petitioner has not shown, by a preponderance of the evidence, that proposed substitute claims 20, 23–25, 27, 29, 32, and 34 are unpatentable for failing to comply with 35 U.S.C. § 112 ¶ 1.

E. Patentability of Proposed Substitute Claims 20, 23–25, 27, 29, 32, and 34 over Sakamoto

Petitioner contends the subject matter of proposed substitute claims 20, 23–25, 27, 29, 32, and 34 would have been obvious over Sakamoto. MTA Opp. 7–15; MTA Sur-reply 7–10. Patent Owner disputes Petitioner's contentions. MTA 20–22; MTA Reply 5–9.

1. Proposed Substitute Claim 20

Petitioner's analysis for proposed substitute claim 20 builds upon its analysis for original claim 1 from the Sakamoto obviousness ground discussed above. We now focus on the amendments in proposed substitute claim 20.

Proposed substitute claim 20 recites "a request rate representing a repeating time interval for ~~of~~ location coordinate packets to be communicated to a target host." MTA 25. Petitioner cites Sakamoto's teaching of position management/positioning server 2 sending position search request messages to position information communication terminal 1. MTA Opp. 7 (citing Ex. 1004 ¶¶ 31–34). In particular, Petitioner cites Sakamoto's teaching of sending position search request messages at a "short cycle" in normal or high sensitivity positioning modes. *Id.* (citing Ex. 1004 ¶ 40). Petitioner further notes that Sakamoto's terminal 1 responds to the position search request message with a search response message that includes position information. *Id.* at 8 (quoting Ex. 1004 ¶¶ 34–35). Petitioner also cites Mr. Andrews's testimony that "'short cycle' tracking would involve sending these position search request messages at a 'regular' rate, *i.e.,* such requests would be transmitted at a 'repeating time interval' (i.e., with a particular frequency) to the position information communication terminal." *Id.* at 8–9 (citing Ex. 1003 ¶¶ 91, 93). Petitioner additionally references its analysis from the Petition regarding Sakamoto's adjusting positioning modes responsive to an estimated charge level of the charge unit and regarding how each mode has an associated refresh rate. *Id.* at 9 (citing Pet. 31–34). Petitioner also contends an ordinarily skilled artisan would

have known that, in Sakamoto's power-off mode, the GPS unit in terminal 1 has an associated transmission rate of 0 Hz. *Id.* (citing Ex. 1003 ¶ 94).

Patent Owner does not dispute Petitioner's analysis of the "request rate" limitation of proposed substitute claim 20. We are persuaded that Sakamoto's positioning server 2 sends position search request messages to terminal 1 at a "short cycle" in normal or high sensitivity positioning modes, which teaches the recited "request rate representing a repeating time interval for ~~of~~ location coordinate packets to be communicated to a target host." *See, e.g.*, Ex. 1003 ¶ 91; Ex. 1004 ¶¶ 31–34, 40.

Proposed substitute claim 20 further recites "a listen rate representing a repeating time interval for receipt of the location coordinate packets from a satellite navigation system." MTA 25. Petitioner contends that Sakamoto's terminal 1 "receives GPS location coordinate packets at a regular rate and that this rate (and the corresponding interval) changes based on the positioning mode." MTA Opp. 10. In particular, Petitioner contends that "*Sakamoto's* position information communication terminal, when continuously operated, has an associated update rate and that, as such, would 'listen' for GPS packets at a 'repeating time interval.'" *Id.* at 11. Petitioner links continuous operation with Sakamoto's high sensitivity positioning mode and contends that, in such a mode, "many GPS receivers generate a position update once per second (i.e., at a rate of 1 Hz)." *Id.* at 10 (quoting Ex. 1003 ¶ 90). Petitioner additionally contends that Sakamoto's normal positioning mode has a listen rate with a "repeating time interval" insofar as Sakamoto sends a satellite signal level request message at "the cycle set in advance in the position information database." *Id.* at 11–12 (citing Ex. 1003 ¶ 92; Ex. 1004 ¶ 37). Petitioner again contends an ordinarily skilled artisan

would have known that, in Sakamoto's power-off mode, the GPS unit in terminal 1 has an associated refresh rate of 0 Hz. *Id.* at 12 (citing Ex. 1003 ¶ 94).

Patent Owner argues that "*Sakamoto's* refresh rate is not the same as 'update rate 446/refresh rate 446/refresh rate' as disclosed in the '451 application." MTA Reply 7. Patent Owner, however, does not identify how Sakamoto's refresh rate differs from that disclosed in the '451 application. In particular, the '774 patent and the '451 application describe an embodiment where "listen rate 425 of location coordinate packets 422 to the host target 428 and response rate 425 include global positioning system (GPS) system refresh rate 446." Ex. 1001, 13:40–43; Ex. 2017, 20:19–21; *see also* MTA Sur-reply 8 (Petitioner making same argument). Therefore, we are persuaded that Sakamoto's GPS system refresh rate, which Petitioner discusses in conjunction with Sakamoto's high sensitivity positioning mode, is a refresh rate in the same sense described in the '774 patent and the '451 application. Pet. 31–32 (citing Ex. 1003 ¶ 90; Ex. 1004 ¶¶ 25, 36), 34 (chart).

Furthermore, Mr. Andrews explains that "a continuously operating GPS receiver (such as *Sakamoto's* GPS receiver operating in high sensitivity positioning mode) has an associated update rate," e.g., once per second (1 Hz). Ex. 1003 ¶ 90. Mr. Andrews also testifies that "the rate at which a GPS receiver listens for . . . signals (the claim[ed] 'location coordinate packets') from GPS satellites is tied to its update rate." *Id.* Thus, consistent with the disclosures in the '774 patent and the '451 application, we are persuaded that Sakamoto's GPS refresh rate teaches the recited "listen rate <u>representing a repeating time interval for receipt</u> of the location coordinate

packets from a satellite navigation system" with respect to Sakamoto's high sensitivity positioning mode. *See* MTA Opp. 9–10; *see also* MTA 30 (Patent Owner's proposed substitute claim 32 reciting that "the listen rate of the location coordinates comprises a global positioning system (GPS) system refresh rate of the location coordinates"); MTA Reply 5 (Patent Owner acknowledging that "request rate, listen rate, and update rate/refresh rate may be represented as time intervals"). We also are persuaded that Sakamoto teaches the "listen rate" limitation insofar as Sakamoto has a periodic GPS listen rate in normal mode at "the cycle set in advance in the position information database." *See, e.g.*, Ex. 1003 ¶ 92; Ex. 1004 ¶ 37.

Proposed substitute claim 20 further recites "the updated set of network communication signaling protocols having a value that is responsive to a user input request <u>and representing a timing schedule for at least one of the request rate and the listen rate</u>." MTA 25–26. Petitioner contends that the disclosed examples of a "schedule" in the '774 patent "correspond to either a time interval or an update frequency, no different from the short-cycle tracking request rate or GPS listen rate present in *Sakamoto* and explained by Mr. Andrews." MTA Opp. 13–14 (citing Ex. 1003 ¶ 89–94; Ex. 1004 ¶¶ 37, 40). Thus, Petitioner contends that each of Sakamoto's positioning modes "has a set associated refresh rate." *Id.* at 14. Petitioner additionally contends that "the '774 Patent gives 'refresh rate' as one example of a 'schedule,'" so "*Sakamoto's* disclosure of per-mode refresh rates for the listen rate and request rate teaches or otherwise renders obvious" the "<u>timing schedule</u>" limitation. *Id.* at 14–15.

Patent Owner disputes Petitioner's analysis of the "<u>timing schedule</u>" limitation. In particular, Patent Owner cites the '451 application for the

proposition that "a time schedule is utilized to determine when to listen for location coordinates (i.e., 'listen rate 425') and transmit those location coordinates (i.e., 'request rate 420')." MTA Reply 4 (citing Ex. 2017, 18:7–9). Moreover, according to Patent Owner,

> "request rate" and "listen rate" represent intervals of a "timing schedule" for when events (i.e., listen for location coordinates and transmit location coordinates) occur while "update rate 446/ refresh rate 446/refresh rate" is an update to the timing schedule that includes "request rate 420 … and/or listen rate 425" as explicitly disclosed by the '451 application.

Id. at 5 (citing Ex. 2017, 17:17–19). Patent Owner further argues that the recited "updated set of network communication signaling protocols" is "a distinct element, in particular distinct from either a 'request rate' or a 'listen rate.'" *Id.* at 8.

As discussed above (*see supra* § III.C), we do not agree that the recited "timing schedule" must be distinct from a refresh rate. Rather, Petitioner cites several examples establishing that "the '774 Patent uses the terms 'refresh rate,' 'update rate' and 'timing schedule' interchangeably" with respect to reference numeral 446. MTA Sur-reply 3–4 (citing Ex. 1001, 11:56–57, 12:59–60, 13:33). Nor do we understand Patent Owner's argument that the '774 patent's use of the abbreviation "e.g." should be read as "based on" rather than "for example" in the context of describing timing schedules. MTA Reply 4 (quoting Ex. 2017, 19:15–19[9]) (arguing that "timing schedule (e.g., refresh rate 446)" should be interpreted as "'timing schedule' based on 'refresh rate 446'"). Instead, the natural reading of the

[9] This disclosure from the '451 application is the same as column 12, lines 57–62 from the issued '774 patent.

’774 patent’s Specification is that a refresh rate is an example of timing schedule. Ex. 1001, 12:57–62. Based on this understanding, we are persuaded by Petitioner’s contention that “*Sakamoto’s* short-cycle tracking request rate and GPS listen rate ‘represent[] a timing schedule’ for the request rate and the listen rate, respectively.” MTA Opp. 13–14 (alteration by Petitioner) (citing Ex. 1003 ¶¶ 89–94; Ex. 1004 ¶¶ 37, 40). We also agree with Petitioner that the “refresh rates for the location coordinate packets transmitted to a target host and received from a satellite navigation system,” which are associated with each of Sakamoto’s three positioning modes, teach the “timing schedule” limitation. *See id.* at 13–15 (including chart on page 14 where each row represents a “timing schedule” for a given mode from Sakamoto).

Patent Owner also repeats several arguments that it makes with respect to the original claims. For example, Patent Owner again argues that Sakamoto does not teach “the updated set of network communication signaling protocols having a value that is responsive to a user input request.” MTA Reply 6–7. In particular, Patent Owner argues that “none of *Sakamoto’s* thresholds ‘represent[] a timing schedule for at least one of the request rate and the listen rate’ and, therefore, *Sakamoto* does not disclose a ‘value that is responsive to a user input request.’” *Id.* at 7. We do not agree for reasons similar to those discussed above with respect to original claim 1. *See supra* § II.D.2. In particular, Petitioner relies on Sakamoto’s teaching of a user selecting a positioning mode. Pet. 34–35 (citing Ex. 1004 ¶ 26). As discussed with respect to claim 1, this changes the “value” of the operating mode and/or the “value” of the request rate and listen rate associated with the selected operating mode. *See, e.g.*, Ex. 1003 ¶¶ 92–93; Ex. 1004 ¶ 28.

And, as discussed directly above, changing Sakamoto's operating mode changes the refresh rates for location coordinate packets transmitted to a target host and received from a satellite navigation system, which is a "timing schedule" as described in the '774 patent. *See, e.g.*, Ex. 1001, 12:57–62; Ex. 1004 ¶¶ 37, 40. Thus, we do not agree with Patent Owner's arguments.

Patent Owner additionally argues that "*Sakamoto* does not disclose an **updated** set of network communication signaling protocols that has a user input request responsive value and represents a timing schedule." MTA Reply 8. Patent Owner further argues that "*Sakamoto* cannot disclose a refresh rate that is generated in substantially real-time." *Id.* at 9. We do not agree with these arguments for the same reasons discussed above for original claim 1. *See supra* § II.D.2. As acknowledged by Patent Owner at the oral hearing, the "updated set based on the claim language would include either/or both a refresh rate and a listen rate." Tr. 39:17–18. Petitioner has established as much because changing Sakamoto's positioning modes updates the listen rate and request rate. *See, e.g.*, Ex. 1003 ¶ 89; Ex. 1004 ¶¶ 5–10, 28. We also are persuaded that Sakamoto's "automatic shift" from high sensitivity mode to normal mode based on the battery falling below a threshold teaches the "substantially real-time" limitation. *See, e.g.*, Ex. 1003 ¶ 88; Ex. 1004 ¶¶ 29, 46.

The remaining limitations in proposed substitute claim 20 are the same as in original claim 1. We have discussed these limitations with respect to claim 1 of the Sakamoto obviousness ground above. *See supra* § II.D.2.

Having considered Petitioner's contentions and evidence and Patent Owner's arguments, we find that Sakamoto teaches every limitation of proposed substitute claim 20 in light of the knowledge of a person of ordinary skill in the art. Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of proposed substitute claim 20 would have been obvious over Sakamoto.

2. Proposed Substitute Claims 23–25

Proposed substitute claims 23–25 depend directly or indirectly from proposed substitute claim 20 and are the same as original claims 4–6 except that the claim dependencies have been updated. We have analyzed all limitations of proposed substitute claims 23–25 above. *See supra* §§ II.D.3–5. Thus, for the same reasons, we determine Petitioner has shown, by a preponderance of the evidence, that the subject matter of proposed substitute claims 23–25 would have been obvious over Sakamoto.

3. Proposed Substitute Claim 27

Petitioner's analysis for proposed substitute claim 27 builds upon its analysis for original claim 8 in the Sakamoto obviousness ground. We now focus on the amendments in proposed substitute claim 27.

Proposed substitute claim 27 recites

> an electrical power resource management component to adjust cycle timing of at least one of a request rate <u>representing a repeating time interval for transmission</u> of location coordinate packets to a target host and a listen rate <u>representing a repeating time interval for receipt</u> of the location coordinate packets responsive to an estimated charge level of the charging unit.

MTA 28. Petitioner relies on the same analysis for the "repeating time interval" limitations discussed above with respect to proposed substitute claim 20. MTA Opp. 7–12. Patent Owner also relies on the same arguments discussed above. MTA Reply 5–9.

Proposed substitute claim 27 further recites "the cycle timing representing a timing schedule for at least one of the request rate and the listen rate." MTA 28. Petitioner relies on the same analysis for the "timing schedule" limitation discussed above with respect to proposed substitute claim 20. MTA Opp. 13–15. Patent Owner also relies on the same arguments discussed above. MTA Reply 5–9.

Thus, based on the same analysis discussed above (*see supra* §§ II.D.6, III.E.1), we determine Petitioner has shown, by a preponderance of the evidence, that the subject matter of proposed substitute claim 27 would have been obvious over Sakamoto.

4. Proposed Substitute Claims 29, 32, and 34

Proposed substitute claims 29, 32, and 34 depend from proposed substitute claim 27 and are the same as original claims 10, 13, and 15 except that the claim dependencies have been updated. We have analyzed all limitations of proposed substitute claims 29, 32, and 34 above. *See supra* §§ II.D.7–9. Thus, for the same reasons, we determine Petitioner has shown, by a preponderance of the evidence, that the subject matter of proposed substitute claims 29, 32, and 34 would have been obvious over Sakamoto.

F. Patentability of Proposed Substitute Claims 20, 23–25, 27, 29, 32, and 34 over Sakamoto and Huang

Petitioner contends the subject matter of proposed substitute claims 20, 23–25, 27, 29, 32, and 34 would have been obvious over the combination of Sakamoto and U.S. Patent No. 7,826,968 B2 (Ex. 2011, "Huang"). MTA Opp. 16–24; MTA Sur-reply 10–12. We already have found proposed substitute claims 20, 23–25, 27, 29, 32, and 34 to be unpatentable over Sakamoto, so we do not reach the ground based on Sakamoto and Huang. *See SAS*, 138 S. Ct. at 1359; *Boston Sci.*, 809 F. App'x at 990.

IV. CONCLUSION[10]

Petitioner has shown, by a preponderance of the evidence, that claims 1, 4–6, 8, 10, 13, and 15 would have been obvious over Sakamoto. Patent Owner has shown that its motion to amend complies with the statutory and regulatory requirements. Nevertheless, Petitioner has shown, by a preponderance of the evidence, that proposed substitute claims 20, 23–25, 27, 29, 32, and 34 would have been obvious over Sakamoto. Thus, we *deny* Patent Owner's motion to amend.

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[10] Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. *See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2).

V. ORDER

Accordingly, it is

ORDERED that claims 1, 4–6, 8, 10, 13, and 15 of the ’774 patent are held to be unpatentable;

FURTHER ORDERED that Patent Owner’s motion to amend is *denied*; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to this proceeding seeking judicial review of our decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

In summary:

Claims	**35 U.S.C. §**	**Reference(s)/Basis**	**Claims Shown Unpatentable**	**Claims Not shown Unpatentable**
1, 4–6, 8, 10, 13, 15	103(a)	Sakamoto	1, 4–6, 8, 10, 13, 15	
1, 4–6, 8, 10, 13, 15	103(a)[11]	Sakamoto, AAPA		
1, 4–6, 8, 10, 13, 15	103(a)[12]	Sakamoto, Hayasaka		
Overall Outcome			1, 4–6, 8, 10, 13, 15	

[11] As explained above, we do not reach this ground. *See supra* § II.E.

[12] As explained above, we do not reach this ground. *See supra* § II.F.

Motion to Amend Outcome	Claims
Original Claims Cancelled by Amendment	
Substitute Claims Proposed in the Amendment[13]	20, 23–25, 27, 29, 32, 34
Substitute Claims: Motion to Amend Granted	
Substitute Claims: Motion to Amend Denied	20, 23–25, 27, 29, 32, 34
Substitute Claims: Not Reached	

[13] Although Patent Owner's motion originally proposed claims to replace dependent claims not challenged in this proceeding (*see* MTA 25–30), Patent Owner later agreed that "only corresponding proposed substitute claims 20, 23-25, 27, 29, 32, and 34 are to be considered in relation to Patent Owner's Motion to Amend." MTA Reply 1; *see supra* § III.B.2.

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NOTE: This disposition is nonprecedential.

United States Court of Appeals for the Federal Circuit

LBT IP I LLC,
Appellant

v.

APPLE INC.,
Appellee

2022-1613, 2022-1614, 2022-1615, 2022-1616, 2022-1617

Appeals from the United States Patent and Trademark Office, Patent Trial and Appeal Board in Nos. IPR2020-01189, IPR2020-01190, IPR2020-01191, IPR2020-01192, IPR2020-01193.

Decided: June 9, 2023

BRIAN SHERWOOD SEAL, Taft Stettinius & Hollister LLP, Washington, DC, argued for appellant. Also argued by SHAUN DARRELL GREGORY.

ADAM PRESCOTT SEITZ, Erise IP, P.A., Overland Park, KS, argued for appellee. Also represented by JENNIFER C. BAILEY, CLIFFORD T. BRAZEN; ABRAN J. KEAN, Greenwood Village, CO.

Before MOORE, *Chief Judge*, LOURIE and STOLL, *Circuit Judges*.

MOORE, *Chief Judge*.

LBT IP I LLC (LBT) appeals five *inter partes* review decisions of the Patent Trial and Appeal Board holding various claims of U.S. Patent Nos. 8,497,774; 8,542,113; 8,102,256; 8,421,618; and 8,421,619 unpatentable. For the following reasons, we affirm in part, reverse in part, vacate in part, and remand in part.

BACKGROUND

LBT's patents relate to improvements in battery power conservation of portable electronic tracking devices. *See, e.g.*, '774 patent at 3:55–4:58. The '113, '256, and '618 patents[1] disclose electronic tracking devices that include location tracking circuitry (e.g., GPS circuitry) and an accelerometer to measure location coordinates without requiring GPS signaling. *See* '618 patent at Fig. 1, 5:4–10. When the strength of the device's GPS signal is below a predetermined threshold value—for example, when the device's access to GPS satellites is partially or fully blocked—portions of the location tracking circuitry may be deactivated to conserve battery power. *Id.* at 5:1–14, 6:66–7:11, 7:62–8:12. The device may subsequently reactivate the location tracking circuitry when the signal level is above the predetermined signal level. *Id.* at 6:66–7:11, 9:48–54.

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[1] LBT raises the same issue on appeal with respect to the '113, '256, and '618 patents. The relevant disclosures in these patents and the Board's relevant analyses in the final written decisions are materially the same. For simplicity, we cite only to the '618 patent and the corresponding final written decision.

The ’774 patent discloses an electronic tracking device that, to conserve power, may intermittently deactivate the GPS receiver in response to a low detected battery level. *See* ’774 patent at 11:44–53, 13:52–67. The claimed device also permits the user to make certain power level adjustments and select between modes with higher update rates but shorter battery lives and modes with lower update rates but longer battery lives. *Id.* at 13:52–14:57; *see also id.* at Fig. 4. This feature allows the user “to select an appropriate update[d] set of network communication signaling protocols to achieve a desired user defined battery operating environment.” *Id.* at 11:58–63.

The ’619 patent discloses an electronic tracking device including an accelerometer and GPS receiver. ’619 patent at 5:2–6, 5:50–6:17. The accelerometer is used to detect movement and to determine location coordinates when GPS signals are not available. *Id.* at 5:3–6, 8:13–15. If the accelerometer determines the tracking device is stationary for a period of time, a last-known location is sent without accessing the GPS signaling circuitry. *Id.* at 8:13–39. Additionally, the GPS receiver may be activated or deactivated based on that determination. *Id.* at 6:54–65, 8:13–19. This approach conserves battery power by reducing use of the GPS receiver when the device is at rest. *Id.* at 8:29–39.

Apple Inc. (Apple) filed five petitions for *inter partes* review challenging claims 1, 4–6, 8, 10, 13, and 15 of the ’774 patent; claims 1–20 of the ’113 patent; claims 8–10 of the ’256 patent; claims 1–24 of the ’618 patent; and claims 1–20 of the ’619 patent as unpatentable. The Board instituted each petition and issued final written decisions holding all challenged claims unpatentable. *Apple Inc. v. LBT IP I LLC* (*’774 Decision*), No. IPR2020-01189, 2022 WL 685040 (P.T.A.B. Mar. 2, 2022); *Apple Inc. v. LBT IP I LLC* (*’113 Decision*), No. IPR2020-01190, 2022 WL 685081 (P.T.A.B. Mar. 2, 2022); *Apple Inc. v. LBT IP I LLC* (*’256 Decision*), No. IPR2020-01191, 2022 WL 683992 (P.T.A.B.

Mar. 2, 2022); *Apple Inc. v. LBT IP I LLC* (*'618 Decision*), No. IPR2020-01192, 2022 WL 683994 (P.T.A.B. Mar. 2, 2022); *Apple Inc. v. LBT IP I LLC* (*'619 Decision*), No. IPR2020-01193, 2022 WL 685082 (P.T.A.B. Mar. 2, 2022).

Specifically, the Board determined the challenged claims of the '113, '256, and '618 patents would have been obvious over Japanese Patent Application Publication No. 2004-37116A (Sakamoto) in view of various combinations of secondary references. *'618 Decision*, at *27. The Board determined the challenged claims of the '774 patent would have been obvious over Sakamoto. *'774 Decision*, at *26. Finally, the Board determined the challenged claims of the '619 patent would have been obvious over prior art combinations that all included U.S. Patent No. 6,940,407 (Miranda-Knapp) and U.S. Patent Application Publication No. 2006/0119508A1 (Miller). *'619 Decision*, at *30. LBT appeals. We have jurisdiction under 28 U.S.C. § 1295(a)(4)(A).

DISCUSSION

LBT raises three distinct challenges on appeal. First, LBT argues the Board's finding that Sakamoto discloses the activation/reactivation limitation in certain claims of the '618, '256, and '113 patents is not supported by substantial evidence. Second, LBT argues the Board improperly construed the term "multitude" in claim 8 of the '774 patent. Finally, LBT argues the Board's finding that a skilled artisan would have been motivated to combine Miranda-Knapp and Miller as claimed in the '619 patent is not supported by substantial evidence. We address each argument in turn.

We review the Board's ultimate determination of obviousness de novo and its underlying findings of fact for substantial evidence. *Pers. Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 991 (Fed. Cir. 2017). What a prior art reference discloses and whether a skilled artisan would have been motivated to combine prior art references are questions of

fact. *Ariosa Diagnostics v. Verinata Health, Inc.*, 805 F.3d 1359, 1364 (Fed. Cir. 2015). We review the Board's claim construction de novo and review any necessary subsidiary factual findings based on extrinsic evidence for substantial evidence. *Apple Inc. v. MPH Techs. Oy*, 28 F.4th 254, 259 (Fed. Cir. 2022).

I. THE '113, '256, AND '618 PATENTS

The Board determined claims 1–20 of the '113 patent; claims 8–10 of the '256 patent; and claims 1–24 of the '618 patent would have been obvious over Sakamoto in view of various combinations of secondary references. *'618 Decision*, at *27. Claim 1 of the '618 patent is representative for purposes of this appeal:

> 1. A portable electronic tracking device to monitor location coordinates of one or more individuals or objects, the device comprising:
>
> transceiver circuitry to receive at least one portion of a receive communication signal comprising location coordinates information;
>
> accelerometer circuitry to measure displacements of the portable electronic tracking device;
>
> *a battery power monitor configured to selectively activate and deactivate at least one portion of the transceiver circuitry and location tracking circuitry to conserve battery power in response to a signal level of the at least one portion of the receive communication signal*; and
>
> processor circuitry configured to process the at least one portion of the receive communication signal.

’618 patent at claim 1 (emphasis added).

With respect to the activation/reactivation limitation,[2] the Board found Sakamoto discloses activating/reactivating the GPS receiver when it transitions from stop-position mode into normal sensitivity positioning mode or high sensitivity positioning mode in its “cycle set in advance” embodiment. *See ’618 Decision*, at *7–12. LBT argues this finding is not supported by substantial evidence. We agree.

Sakamoto discloses a GPS positioning system that includes a portable terminal with a GPS receiver. J.A. 1321 ¶ 18. In one embodiment, the GPS signal level is periodically measured at a “cycle set in advance.” J.A. 1323–24 ¶ 37. If the signal level is equal to or lower than a predetermined threshold value, then the system transitions to high sensitivity positioning mode, where the GPS receiver is operated constantly. J.A. 1319 ¶ 4; J.A. 1324 ¶ 38. If the signal level is equal to or higher than a predetermined threshold value, then it transitions to normal sensitivity positioning mode, in which the GPS receiver is operated only when necessary. J.A. 1319 ¶ 4; J.A. 1324 ¶ 38. Finally, if “the positioning cannot be performed when the signal level value is equal to or lower than a predetermined threshold value,” then it transitions into stop-position mode, i.e., the GPS receiver stops position searching. J.A. 1324 ¶ 38.

It is undisputed that Sakamoto does not expressly disclose transitioning from stop-position mode into one of the other two positioning modes. *See ’618 Decision*, at *11 (“Sakamoto may not explicitly identify moving out of the stop-position mode as a result of the cyclic signal level checking . . . .”); *see also* J.A. 1322 ¶ 27 (disclosing transition

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[2] All of the challenged claims in the ’618 and ’256 patents recite the activation/reactivation limitation, but only claims 3, 9, and 11 of the ’113 patent recite this limitation.

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between normal sensitivity positioning mode and high sensitivity positioning mode); J.A. 1324 ¶ 38 (disclosing transition into stop-position mode). The Board and Apple thus relied on Apple's expert Mr. Andrews' testimony to fill in the gap in this disclosure. *'618 Decision*, at *10–12. Mr. Andrews testified that a skilled artisan would have understood that if Sakamoto's receiver is in stop-position mode and the periodically-measured signal level is greater than a predetermined threshold level, the GPS receiver reactivates by transitioning into normal or high sensitivity positioning mode. J.A. 6414–15 ¶ 138 (citing J.A. 1323–24 ¶¶ 37–38); J.A. 3636–37 ¶ 212. He also testified that a skilled artisan would have understood a device that transitioned into stop-position mode and never transitioned into one of the other positioning modes would be useless. J.A. 3637 ¶ 213; *see also* J.A. 1979 at 21:7–15 (Andrews deposition) ("[Sakamoto] doesn't contemplate that once the – once the GPS signal level went below that threshold, the system would turn off and never turn on again. That would be – that wouldn't be very practical."); J.A. 1982 at 24:4–10.

Although Apple does not purport to rely on inherency, its argument regarding Sakamoto's disclosure is substantively one of inherency. Apple concedes there is no explicit disclosure of a transition out of stop-position mode in Sakamoto, but nevertheless argues a skilled artisan would understand this transition is present in the cycle set in advance embodiment. In other words, Apple argues this transition is *inherently disclosed* in Sakamoto. "[T]o rely on inherency to establish the existence of a claim limitation in the prior art in an obviousness analysis," Apple must show the activation/reactivation limitation is "necessarily present" or "the natural result of the combination of elements explicitly disclosed by the prior art." *PAR Pharm., Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1195–96 (Fed. Cir. 2014). Mr. Andrews' testimony fails to meet this standard for inherent disclosure. *See id.* at 1195.

In his deposition, for example, Mr. Andrews repeatedly used qualifying language such as "presumably," "maybe," and "might" when he explained that although the GPS receiver is deactivated when in the stop-position mode, a skilled artisan would understand Sakamoto turns on components of the GPS receiver to cyclically measure the signal level. *See, e.g.*, J.A. 1981–82 at 23:10–24:3 ("Well, Sakamoto doesn't describe how he determines that the signal level is above that threshold. *It's possible* that he periodically turns on the GPS receiver just briefly to check so that it's – most of the time it's off and every now and then he turns it on and looks, and if it's not above the level, he turns it back off, or *maybe* even just turns those components that he needs to use to examine the signal, and *it's possible* that he *might* leave some of the components on . . . . (emphases added)); *'618 Decision*, at *12 (relying on Mr. Andrews' deposition testimony to reject LBT's argument that because Sakamoto's GPS receiver is the only component that receives GPS signals, it cannot obtain the necessary signal required to move into a different mode when it is deactivated in stop-position mode). "Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." *PAR*, 773 F.3d at 1195 (quoting *In re Oelrich*, 666 F.2d 578, 581 (CCPA 1981)).

Mr. Andrews provides no testimony explaining why the transition from stop-position mode into one of the other two positioning modes in response to a GPS signal *must necessarily be present* in Sakamoto's cycle set in advance embodiment. He opines that a skilled artisan would understand the device transitions out of stop-position mode because otherwise the device would be useless. *See* J.A. 3637 ¶ 213 (Andrews declaration); J.A. 1982 at 24:4–10 (Andrews deposition). But he fails to explain why this transition is necessarily present considering that Sakamoto teaches its GPS receiver can be *manually* reactivated after it has been placed in stop-position mode. J.A. 1321 ¶ 20. The fact that

the GPS receiver cannot automatically transition out of stop-position mode in the cycle set in advance embodiment does not render Sakamoto's device useless because the receiver can be turned on manually.

We conclude substantial evidence does not support the Board's finding that Sakamoto discloses the activation/reactivation limitation. Accordingly, we reverse the Board's obviousness determinations with respect to claims 1–24 of the '618 patent, claims 8–10 of the '256 patent, and claims 3, 9, and 11 of the '113 patent.[3]

II. THE '774 PATENT

The Board determined claims 1, 4–6, 8, 10, 13, and 15 of the '774 patent would have been obvious over Sakamoto. *'774 Decision*, at *26. On appeal, LBT challenges the Board's construction of "multitude of threshold values" as recited in independent claim 8 and dependent claims 10, 13, and 15. Claim 8 is representative and recites:

> 8. A local charging management device to manage electrical resource capability for

---

[3] In a footnote, LBT argues that although independent claims 1, 7, and 17 of the '113 patent do not require activation/reactivation, we should also reverse the Board's obviousness determination with respect to those claims because the reduction of power required by these claims does not eliminate the ability of the invention to receive and measure the signal level for reactivation, as required by dependent claim 3. The Board rejected this argument because it is not commensurate with the scope of the claims—these claims recite reducing or adjusting the power to the primary location tracking circuitry, not reactivating the primary location tracking circuitry. *See '113 Decision*, at *7, *13, *16. We decline to disturb the Board's determination based on LBT's undeveloped footnote argument.

> an electronic tracking device that is tracked by at least one other tracking device comprising:
>
> a battery power level monitor;
>
> a charging unit; and
>
> an electrical power resource management component to adjust cycle timing of at least one of a request rate of location coordinate packets to a target host and a listen rate of the location coordinate packets responsive to an estimated charge level of the charging unit,
>
> wherein the battery power level monitor measures a power level of the charging unit and adjusts a power level applied to location tracking circuitry responsive to one or more signal levels, the power level comprising a *multitude of threshold values* determined by a user or system administrator to intermittently activate or deactivate the location tracking circuitry to conserve power of the charging unit in response to the estimated charge level of the charging unit.

’774 patent at claim 8 (emphasis added).

The Board construed “multitude” to mean two or more. *’774 Decision*, at *4–6. LBT argues the proper construction of “multitude” does not include two. We agree.

Claim terms are generally given their plain and ordinary meaning, which is the meaning one of ordinary skill in the art would ascribe to a term when read in the context of the claim, specification, and prosecution history. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1313–14 (Fed. Cir. 2005) (en banc). “There are only two exceptions to this general rule: 1) when a patentee sets out a definition and acts

as his own lexicographer, or 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution." *Thorner v. Sony Comput. Ent. Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012).

The plain and ordinary meaning of multitude in the '774 patent does not encompass two threshold values. The only example of a multitude of threshold values provided in the specification is Figure 4, which depicts 5–7 threshold values. '774 patent at Fig. 4 (threshold values represented by tick marks on active display 432); *id.* at 13:58–67 ("[T]he present invention has the capability of power level (e.g., battery power level 406) adjustments include *multitude of threshold values* (*see active display 432 of FIG. 4*) that is determined by user . . . to intermittently activate or deactivate location tracking circuitry . . . ." (emphasis added)).

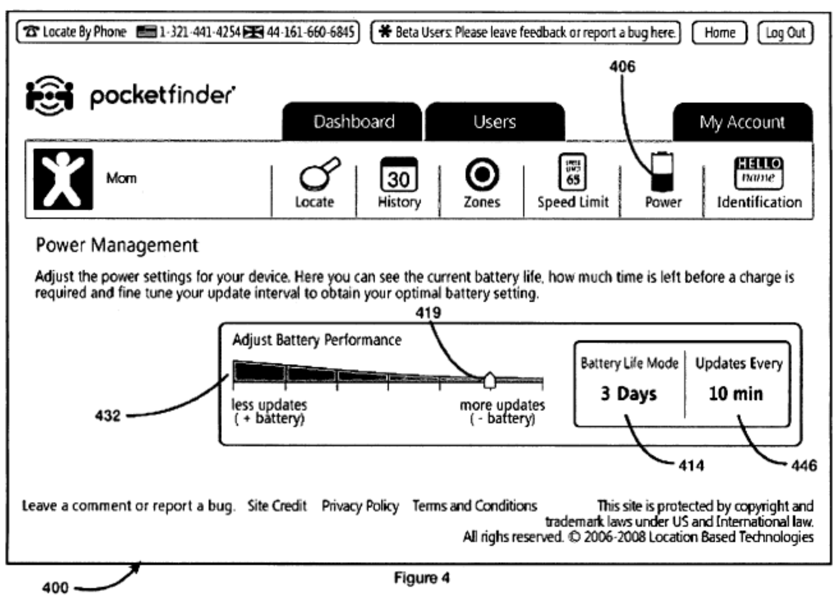

Figure 4

Nowhere does the specification contemplate as few as two threshold values. In concluding otherwise, the Board relied on the following passage: "Advantageously as compared to conventional tracking devices, user input request 430 adjusts value 419 to select an appropriate update set

of network communication signaling protocols to achieve a desired user defined battery operating environment, e.g., *obtain optimal battery life, obtain optimal update rate, tradeoffs between them*." *Id.* at 11:58–67 (emphasis added). According to the Board, this statement shows that "tradeoffs can be made between as few as two points: an endpoint where less updates are traded for better battery life, and an endpoint where worse battery life is traded for more updates." *'774 Decision*, at *5. While the Board may be correct that this isolated sentence is consistent with as few as two threshold values, this sentence must be read in the context in which it is used. This statement appears in column 11 of the specification, all of which discusses Figure 4. *See* '774 patent at 11:2–67 ("Referring to FIG. 4 . . . ."). Figure 4 clearly depicts 5–7 threshold values. Read in context, "optimal battery life" and "optimal update rate" refer to the end points on the active display in Figure 4, while the "tradeoffs between them" refer to the tick marks between the end points. *Id.* at 11:62–63; *see also id.* at 11:64 ("slider 432" can be positioned at "value 419" between the two end points). We therefore do not read this sentence as showing multitude includes two threshold values.

The Board also found certain dictionary definitions supported its construction of multitude as two or more. *'774 Decision*, at *6. To the extent the Board found the dictionaries show the plain and ordinary meaning of multitude is two or more, this finding is not supported by substantial evidence. The dictionaries define multitude as "[t]he condition or quality of being numerous," "[a] very great number," and "a large number." IPR2020-01189, Ex. 3001 at 3; Ex. 3002 at 3. Plurality is defined as "[t]he state or fact of being plural" (i.e., two or more) or "[a] large number or amount; a multitude." Ex. 3001 at 4; *see also* Ex. 3002 at 4. Plurality is only a synonym of multitude in the context of the second definition: a large number or amount. A plurality is two or more; a multitude is a large number.

As part of its obviousness determination with respect to claims 8, 10, 13, and 15, the Board found Sakamoto's two battery power level thresholds disclose the claimed "multitude of threshold values" under its improper construction. *'774 Decision*, at *15–16. We therefore vacate the Board's decision with respect to these claims. Because the Board incorrectly concluded a multitude includes two, it did not address Apple's alternative argument that Sakamoto discloses at least four threshold values—two battery level thresholds and two GPS signal level thresholds. *See* IPR2020-01189, Petitioner's Reply Br. at 15–19. We remand to the Board for it to consider this argument in the first instance under the proper construction. We hold only that multitude does not include two but must include as few as five threshold values. We leave it for the Board on remand to determine whether multitude encompasses three or four threshold values and whether the two sets of threshold values disclosed in Sakamoto teach a multitude of threshold values.

III. THE '619 PATENT

The Board determined claims 1–20 of the '619 patent would have been obvious over prior art combinations including Miranda-Knapp and Miller. *'619 Decision*, at *30. Claim 1 of the '619 patent is representative. It recites:

> 1. A portable electronic tracking device to monitor location coordinates of one or more individuals and objects, the device comprising:
>
> transceiver circuitry to receive at least one portion of a receive communication signal comprising location coordinates information;
>
> accelerometer circuitry to measure displacements of the portable electronic tracking device, wherein the displacements comprise movements of an object or individual associated with the device;

> *a battery power monitor configured to activate and deactivate at least one portion of signaling circuitry in response to the accelerometer circuitry detecting a substantially stationary position of the electronic tracking device since last known location coordinate measurement*; and
>
> processor circuitry configured to process the displacements, to associate the displacements with a specified pattern, and to generate an alert message in response to the specified pattern.

’619 patent at claim 1 (emphasis added).

As relevant on appeal, the Board found Apple’s proposed combination of Miranda-Knapp and Miller discloses the claim limitation reciting “a battery power monitor configured to activate and deactivate at least one portion of signaling circuitry in response to the accelerometer circuitry detecting a substantially stationary position of the electronic tracking device.” *’619 Decision*, at *8–12. The Board found Miranda-Knapp teaches a battery power monitor configured to *activate* a portion of signaling circuitry (i.e., messaging circuitry) to send an alert message in response to an accelerometer detecting a substantially stationary position. *Id.* at *10. It further found Miller teaches *deactivating* a portion of signaling circuitry (i.e., GPS circuitry) by halting scanning operations on the GPS receiver when the device is stationary. *Id.* The Board found a skilled artisan would have been motivated to add Miller’s teachings of deactivating GPS circuitry to Miranda-Knapp’s device to increase the device’s battery life. *Id.* at *11.

LBT raises several arguments against the Board’s motivation-to-combine finding. First, LBT argues the combination of Miranda-Knapp and Miller is improper because it adds redundant elements and functionality already present in Miranda-Knapp’s device. For instance, as Apple’s expert Mr. Andrews testified, both references disclose

"similar architectures that include receivers, processors, power managers, and accelerometers." J.A. 6980 ¶ 132. According to LBT, a skilled artisan would not be motivated to combine these redundant elements. LBT misunderstands the Board's finding. The Board did not find a skilled artisan would combine every feature of Miller's device with Miranda-Knapp's device. Instead, it found a skilled artisan would be motivated to add certain functionality from Miller to Miranda-Knapp's device, which discloses the claimed transceiver circuitry and accelerometer circuitry. *'619 Decision*, at *7–8, *11. That Miller discloses a similar device with several overlapping elements supports the Board's finding of a motivation to combine. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007) ("[I]f a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.").

LBT also contends the Board failed to identify the redundant functionality between Miranda-Knapp and Miller, namely, deactivating signaling circuitry in response to the accelerometer detecting a substantially stationary position. Miranda-Knapp teaches that, to conserve battery power, "certain transmissions or phone calls could be inhibited" if the phone is left at rest in a safe zone. J.A. 7057 at 5:13–18. This disclosure relates to the deactivation of Miranda-Knapp's *messaging circuitry*. The proposed combination, however, incorporates Miller's deactivation of its *GPS circuitry,* a different signaling circuitry. *See '619 Decision*, at *11. LBT fails to explain how this functionality is redundant.

Second, LBT argues the proposed combination of Miranda-Knapp and Miller would result in an inoperable device because the two references disclose contradictory approaches. Specifically, Miranda-Knapp teaches *activating* a GPS receiver when a device is stationary, while Miller teaches *deactivating* a GPS receiver when a device is

stationary. This argument, again, is based on LBT's fundamental misunderstanding of the proposed combination. The Board found a skilled artisan would have been motivated to modify Miranda-Knapp's device to deactivate its GPS receiver *after* its location is determined—i.e., after activating a portion of the signaling circuitry—to conserve battery power. *Id.* at *10–11. LBT fails to point to any evidence showing this combination would be inoperable. Instead, substantial evidence supports the Board's finding that a skilled artisan would have been motivated to increase the device's battery life by deactivating the GPS receiver after the location is determined and would have a reasonable expectation of success in doing so. For example, Mr. Andrews testified that a skilled artisan would have been motivated to increase the device's battery life and would have recognized that deactivating the GPS receiver after the stationary device's location has already been determined would accomplish this goal. J.A. 7002–07 ¶¶ 162–168; *see also* J.A. 7056–57 (Miranda-Knapp) at 4:57–5:43 (identifying the need to alert the user "before the battery drains" when the device is at rest but not in a safe zone); J.A. 7079 (Miller) ¶¶ 18, 22 (teaching that when the device is stationary, the scanning operations of receivers are halted in order to conserve battery power).

Finally, LBT argues Miller teaches away from the claimed solution because it discloses using a motion model, rather than an accelerometer alone, to determine whether the device is in motion. Substantial evidence supports the Board's contrary finding. *See '619 Decision*, at *12. Miller states "[a]ccelerometer 114 sends signals to motion model 108 indicating whether or not the mobile device is in motion." J.A. 7079 ¶ 18. That is, Miller teaches that an accelerometer is used to detect a stationary position. While the motion model also uses signals from receivers 102, 104, and 106, in some circumstances, the data from the accelerometer may be the only data relied on by the motion model. J.A. 7079 ¶¶ 21–22.

Substantial evidence supports the Board's finding that a skilled artisan would have been motivated to combine Miranda-Knapp and Miller as claimed. We therefore affirm the Board's obviousness determinations with respect to claims 1–20 of the '619 patent.

CONCLUSION

We have considered the parties' remaining arguments and find them unpersuasive. For the reasons given above, we reverse the Board's decisions with respect to claims 1–24 of the '618 patent, claims 8–10 of the '256 patent, and claims 3, 9, and 11 of the '113 patent. We vacate and remand the Board's decision with respect to claims 8, 10, 13, and 15 of the '774 patent. We affirm the Board's decision with respect to claims 1–20 of the '619 patent.

AFFIRMED IN PART, REVERSED IN PART, VACATED IN PART, AND REMANDED IN PART

COSTS

No costs.

Trials@uspto.gov
571-272-7822

Paper 43
Date: August 22, 2023

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

LBT IP I LLC,
Patent Owner.

IPR2020-01189
Patent 8,497,774 B2

Before JOHN A. HUDALLA, SHEILA F. McSHANE, and JULIET MITCHELL DIRBA, *Administrative Patent Judges*.

HUDALLA, *Administrative Patent Judge*.

ORDER
Conduct of the Proceeding
37 U.S.C. § 42.5

A conference call in the above proceeding was held on August 21, 2023, between respective counsel for the parties and Judges Hudalla, McShane, and Dirba. The purpose of the call was to discuss procedures for the remand of this case from the Court of Appeals for the Federal Circuit. *See* Papers 41, 42.

In particular, the Federal Circuit vacated and remanded our obviousness determinations with respect to claims 8, 10, 13, and 15 of the ’774 patent. Paper 42, 13. The court’s decision hinged on its construction of “multitude of threshold values” in the following limitation of claim 8:

> wherein the battery power level monitor measures a power level of the charging unit and adjusts a power level applied to location tracking circuitry responsive to one or more signal levels, the power level comprising a *multitude of threshold values* determined by a user or system administrator to intermittently activate or deactivate the location tracking circuitry to conserve power of the charging unit in response to the estimated charge level of the charging unit.

Ex. 1001, 16:53–61 (emphasis added). The court stated that “[t]he plain and ordinary meaning of multitude in the ’774 patent does not encompass two threshold values.” Paper 42, 11. Further clarifying its construction, the court stated that “multitude does not include two but must include as few as five threshold values.” *Id.* at 13. Thus, the court vacated our determination that Sakamoto’s two battery power level thresholds teach the claimed “multitude of threshold values.” *Id.*

The court also noted that we did not address Petitioner’s alternative argument that Sakamoto teaches at least four threshold values—two battery level thresholds and two GPS signal level thresholds. Paper 42, 13. Accordingly, the court remanded this case to us to determine “whether multitude encompasses three or four threshold values and whether the two

sets of threshold values disclosed in Sakamoto teach a multitude of threshold values." *Id.*

Petitioner only has put forth a single unpatentability theory for which it contends that Sakamoto teaches more than two threshold values, i.e., that Sakamoto's two battery level thresholds and two GPS signal level thresholds together teach the recited "multitude of threshold values."[1] *See* Paper 25, 15–19. Accordingly, we ask the parties to brief whether—as a matter of claim construction—the "threshold values" in the recited "multitude of threshold values" are limited to battery power level threshold values or else whether they may also include signal level threshold values. The panel feels this issue may be dispositive given the present posture of the case. A schedule for simultaneous opening and responsive claim construction briefs is set forth below. No new evidence may be submitted except file histories for patent applications related to the '774 patent (if necessary).

It is hereby

ORDERED that Petitioner and Patent Owner are each authorized to file one opening brief limited to addressing the construction of "a multitude of threshold values" in claim 8 and whether the recited "threshold values"

[1] During the call, Petitioner sought leave to develop further unpatentability theories based on Sakamoto to address the possibility that a "multitude of threshold values" might include 3–7 thresholds. Patent Owner countered that this was unnecessary given that Patent Owner had already argued in its Response that a "multitude" was more than two (*see* Paper 17, 14–17) and given that Petitioner had already put forth a new responsive unpatentability theory in its Reply (*see* Paper 25, 15–19). We agree with Patent Owner and do not anticipate opening the record on remand to further unpatentability theories.

are limited to battery power level threshold values or else whether they may also include signal level threshold values;

FURTHER ORDERED that each opening brief shall be seven pages or less in length and filed no later than September 6, 2023;

FURTHER ORDERED that Petitioner and Patent Owner are each authorized to file one responsive brief limited to addressing the arguments in the other party's opening brief;

FURTHER ORDERED that any responsive brief shall be seven pages or less in length and filed no later than September 20, 2023; and

FURTHER ORDERED that Petitioner and Patent Owner shall not file any additional evidence with their briefs with the exception of file histories for related patent applications.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,

Petitioner

v.

LBT IP I LLC,

Patent Owner

Case IPR2020-01189
U.S. Patent No. 8,497,774

PATENT OWNER'S OPENING BRIEF

I. INTRODUCTION

Patent Owner submits this Opening Brief on Remand in *Inter Partes* Review IPR2020-01189 for U.S. Patent No. 8,497,774 ("the '774 Patent"). None of the '774 Patent's claims, specification or prosecution history ever refers to a GPS signal level as a "power level," but only as a "signal level." EX. 1001 at 2:64-65, 7:57-58, 8:10, 8:16, 13:58, 16:56. As such, the proper construction of the term "a multitude of threshold values" recited in claim 8 is limited to battery power level threshold values.

II. ARGUMENT

It is clear from the '774 Patent's claim language, specification, and prosecution history that the term "a multitude of threshold values" in claim 8 is limited to power level threshold values and does not include GPS signal strength values. Independent claim 8 recites:

> 8. A local charging management device to manage electrical resource capability for an electronic tracking device that is tracked by at least one other tracking device comprising:
>
> a battery power level monitor;
>
> a charging unit; and
>
> an electrical power resource management component to adjust cycle timing of at least one of a request rate of location coordinate packets to

> a target host and a listen rate of the location coordinate packets responsive to an estimated charge level of the charging unit,
>
> wherein *the battery power level monitor* measures a power level of the charging unit and adjusts a power level applied to location tracking circuitry responsive to one or more signal levels, ***the power level comprising a multitude of threshold values*** determined by a user or system administrator to intermittently activate or deactivate the location tracking circuitry to conserve power of the charging unit in response to the estimated charge level of the charging unit.

EX1001, 16:43-61 (emphasis added). The claim language itself thus shows that the "multitude of thresholds" refers to the power level that is monitored and adjusted by the battery power level monitor.

This conclusion is supported by the specification, which repeatedly and consistently identifies the claimed power level with battery power level 406. *See id.*, 13:52-58 ("…measures **a power level (e.g., battery power level 406**) of power charging unit (e.g., battery 118) and adjusts **a power level (e.g., battery power level 406)**...") (emphasis added); *see also* 13:58-67 ("the present invention has the capability of **power level (e.g., battery power level 406)** adjustments include multitude of threshold values (see active display 432 of FIG. 4)…") (emphasis

added). That is, a user may select any of a "multitude of threshold values" which correspond to battery power level adjustments.

The prosecution history further supports this conclusion. As originally filed, the "multitude of threshold values" limitation was recited in former dependent claim 17. *See* EX2019, at 372. As filed, original dependent claim 17 recited:

> 17. The apparatus of claim 16, wherein ***the power level comprises a multitude of threshold value[s]*** determined by a user or system administrator to intermittently activate or deactivate the location tracking circuitry to conserve power of the power charging unit in response to the estimated charge level of the power unit.

Id. (emphasis added). The limitation also makes clear that the "multitude of threshold values" are used "to intermittently activate or deactivate the location tracking circuitry." And the '774 Patent clearly defines "threshold value[s]…to intermittently activate or deactivate the location tracking circuitry" as timing schedules or intervals for location determination, *i.e.*, turning the location tracking circuitry on and off. *See* EX1001, 11:44-67; *see also* 12:32-49, 14:1-57, 15:4-21. That is, in context, the "multitude of threshold values" can only be battery power level threshold values.

The specification discloses that battery power level adjustments may be based on user input. For example, the '774 Patent discloses:

> …, *local battery power adjustment mechanism 416*…communicates a message to active or deactivate a portion of transceiver circuitry 102 or processor circuitry 104 or location tracking circuitry 114…*responsive to value 419* (e.g., a user input screen control or mouse adjustable cursor value). …local battery adjustment mechanism 416 includes user adjustable screen icon 432 to graphically display in substantially real-time trade-off relationships between remaining battery charge level 414 and update rate 446 (e.g., refresh rate) of location coordinate packets 422. Advantageously as compared to conventional tracking devices, *user input request 430 adjusts value 419 to select an appropriate update set of network communication signaling protocols to achieve a desired* ***user defined battery operating environment***, e.g., obtain optimal battery life, obtain optimal update rate, tradeoffs between them.

Id., 11:44-63 (emphasis added). The ’774 Patent also discloses "the ***capability of power level (e.g., battery power level 406) adjustments include multitude of threshold values*** (see active display 432 of FIG. 4)…to intermittently activate or deactivate location tracking circuitry." *Id*., 13:58-67 (emphasis added). As clearly disclosed, the recited "multitude of threshold values" corresponds to value 419, which is explicitly disclosed as defining a battery power level threshold that can be adjusted to a multitude of values. *See id*., FIG. 4.

In contrast with the above, none of the ’774 Patent's claims, specification or prosecution history ever refers to a GPS signal level as a "power level," but only as a "signal level." EX. 1001 at 2:64-65, 7:57-58, 8:10, 8:16, 13:58, 16:56. It is thus

clear that "the power level comprising a multitude of threshold values" is limited to the battery power level and does not include the GPS signal strength level.

Of note, Patent Owner addressed the fact that "the power level comprising a multitude of threshold values" is a distinct limitation that does not have any reference to a signal level in Patent Owner's Sur-Reply, in response to Petitioner's new and untimely unpatentability theory. *See* Paper 31, 13. Further, Patent Owner articulated that it would be improper to combine two different types of thresholds (*e.g.*, GPS signal thresholds and power level thresholds) to otherwise meet this clear limitation. *See id.*, 13-14. To be clear, "one or more signal levels" refers to a measurement of a GPS signal and does not refer to a timing schedule or intervals for location determination and/or exchanging location information. Petitioner, throughout the prior briefing, has acknowledged that *Sakamoto* discloses at most two power level threshold values. In view of the proper construction that "[t]he plain and ordinary meaning of multitude in the '774 Patent does not encompass two threshold values" (Paper 42, 11), *Sakamoto* cannot disclose this limitation. And when "multitude of threshold values" is properly construed such that "threshold values" are limited to battery power level threshold values, *Sakamoto* clearly cannot disclose this limitation.

III. CONCLUSION

For the reasons set forth above, the proper construction of “multitude of threshold values” is such that the recited “threshold values” are limited to battery power level threshold values and claims 8, 10, 13, and 15 of the ’774 Patent are not unpatentable.

Dated: September 6, 2023

Respectfully submitted,

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
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v.

LBT IP I LLC,
Patent Owner

Inter Partes Review Case No. IPR2020-01189
U.S. Patent No. 8,497,774

PETITIONER APPLE INC.'S OPENING CLAIM CONSTRUCTION BRIEF ADDRESSING "A MULTITUDE OF THRESHOLD VALUES"

Pursuant to the Federal Circuit's remand, the Board requested the Parties to address whether—as a matter of claim construction—the "threshold values" in the recited "multitude of threshold values" are limited to battery power threshold values or whether they may also include GPS signal level threshold values. Paper 43, at 3. As discussed below, any construction of "threshold values" must include *both* battery power *and* GPS signal level threshold values.

The '774 Patent indisputably resolves this issue because it describes an embodiment that includes GPS signal level as part of the multitude of threshold values:

> In one embodiment, the accelerometer 130 activates upon one or more designated antenna(s), e.g., antennas 122a, 122b, **detecting a first signal level, e.g., a low signal level or threshold value**, as specified by, for instance, a user or system administrator.

Ex. 1001, 7:55-59. As the specification and Figures make clear, antennas 122a and 122b are the antennas that are utilized for "acquir[ing] a snapshot of receive communication signal **including location coordinates data**." *Id.*, 10:41-44; *see also* Fig. 1 (connecting antennas 122a/b to the "location tracking circuitry" and the "signal detecting circuitry"). Any suggestion that these antennas are used to detect a "low signal level or threshold value" of the battery would be nonsensical. That is not how antennas operate. The '774 Patent contemplates using GPS signal levels as part

of the multitude of threshold values because it recognizes that GPS is one of the biggest draws on battery power. The ’774 Patent acknowledges that “GPS satellite communication signals may be obstructed or partially blocked, hindering tracking and monitoring capability.” *Id.*, 3:2-3. In those situations, “a GPS transceiver [is] receiving a weak GPS signal” and “the GPS transceiver is depleting battery power in failed attempts to acquire communication signals from one or more … GPS satellites.” *Id.*, 2:4-8.

The ’774 Patent solves this problem by describing an embodiment where the system will monitor and detect GPS signal levels and, when they reach a certain threshold—e.g., they are too weak—the system will deactivate the GPS to save power while activating the accelerometer to still provide navigation to the user. This is the precise embodiment described by the ’774 Patent when it equates a low GPS signal level with a threshold value. In this embodiment, when the system detects “a low signal level **<u>or threshold value</u>**” of the GPS signals, the “electrical circuitry associated with GPS signal acquisition … may be, for instance, placed on standby or in a sleep mode” so that the system “[conserves] a battery level of the battery.” *Id.*, 7:55-8:3; *see also* 8:7-16; *see also Id.*, 8:67-9:3. This solves the problem of the ‘774 patent, which is that “receiving a weak GPS signal … deplet[es]ing battery power.” *Id.*, 3:2-7. This is only possible if your “low signal level or threshold value” is reading the strength of GPS signal levels.

The system utilizes the GPS signal threshold to know when to deactivate the GPS circuitry to save power while also knowing when to activate accelerometer circuitry to continue providing the user with navigation.

> As described above, when GPS signal is not practicable, electronic device proximity measurements [e.g., accelerometer 130] provide differential location coordinate information to calculate coordinate information.

Ex. 1001, 9:14-16. Figure 3 illustrates how the invention of the '774 Patent utilizes this GPS signal level threshold to determine whether to activate/deactivate the GPS and the accelerometer circuitry:

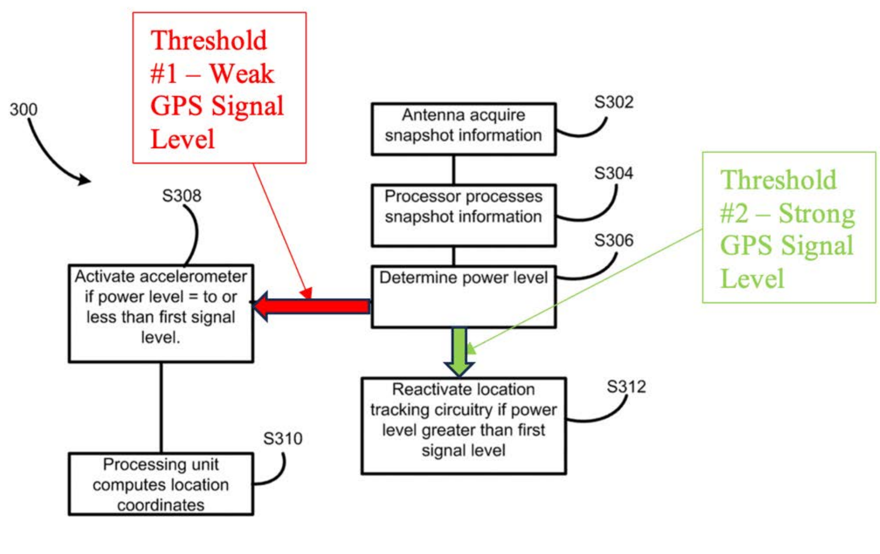

Figure 3

Starting at Step S302, the GPS antennas acquire a snapshot of the receive communication signal. Ex. 1001, Fig. 3, 10:38-52. The processor will then analyze the snapshot information acquired by the GPS antennas in Step S304. *Id.* In Step

S306, "processing unit 104 determines a power level of receive communication signal levels." *Id.* It is at this point that the threshold values using the GPS signal are analyzed and one of two actions are taken. The first possibility is that the GPS signal levels show a threshold value indicating a weak GPS signal that causes the system to activate its accelerometer: "In step 308, ***accelerometer 130 activates if a power level of the receive communication signal is insufficient for processing***." *Id.*, 10:47-49; Fig. 3, Step S308; *compare with* 7:55-59 (describing a "low signal level or threshold value" of the GPS receive communication signal as received by the antenna); *see also id.*, 8:7-16 (generally discussing determining if the GPS receive communication signal is above a first signal level). The second possibility is that the GPS signal levels show a threshold value indicating a strong GPS signal that causes the system to reactive the GPS circuitry: "In another variation of step 312, upon determining receive communication signal of sufficient signal strength, accelerometer 130 is deactivated and location tracking circuitry 114 are activated, and processing unit 104 determines location coordinates from the receive communication signal." *Id.*, 10:62-67; *see also* 10:58-62.

Notably, this embodiment would be inoperable if it solely looked at a multitude of battery level thresholds. Indeed, the embodiment of Figure 3 has nothing to do with examining a battery level because utilizing threshold values for GPS signals is how one embodiment of the '774 Patent accomplishes its goal of

preventing significant battery drain. *See* Ex. 1001, 3:2-9 ("GPS satellite communication signals may be obstructed or partially blocked, hindering tracking and monitoring capability. Not only is a GPS transceiver receiving a weak GPS signal, but also the GPS transceiver is depleting battery power in failed attempts to acquire communication signals from one or more … GPS satellites.").

Utilizing only battery levels as the multitude of threshold values simply would not work with the embodiment of Figure 3. For example, in the situation described above, the battery charge level may be high (e.g., 90%+) but the GPS signal level is low. If the system only looked at a multitude of battery threshold values (and excluded GPS signal levels), it would never deactivate the GPS circuitry in the Figure 3 embodiment, which would lead to a significant drain on the battery. *Id.*, 3:2-8. This would run counter to the very goal of the '774 Patent. *Id.*, 8:67-9:1 ("the present invention conserves battery power").

A construction of "multitude of threshold values" that excludes GPS signal levels would read out this specific embodiment of the '774 Patent. The Federal Circuit has repeatedly admonished against such a construction noting that "a claim construction excluding a preferred embodiment is rarely, if ever correct." *Sequoia Tech., LLC v. Dell, Inc.*, 66 F.4th 1317, 1327 (Fed. Cir. 2023) (*citing Kaufman v. Microsoft Corp.*, 34 F.4th 1360, 1372 (Fed. Cir. 2022)). The only scenario in which such a construction would be correct is if the plain language of the claim itself

excluded the preferred embodiment, and that situation is not present here. *See, e.g., Pacing Techs., LLC v. Garmin Int'l, Inc.,* 778 F.3d 1021, 1026 (Fed. Cir. 2015) (noting the preferred embodiment may only be excluded "where the plain language of a limitation of the claim does not appear to cover that embodiment."). The language of claim 8 broadly describes "a multitude of threshold values" that are used "to intermittently activate or deactivate the location tracking circuitry **to conserve power**." Ex. 1001, at claim 8. There is no limiting language. Nor is there any language expressly excluding the preferred embodiment. This is because the claim language tracks the exact embodiment described in columns 7-10 and Figure 3, which expressly uses GPS signal values as "a threshold value" to "conserve[] battery power. *Id.*, 7:58, 8:67-9:5. It would be reversible error to construe "multitude of threshold values" to be limited only to battery power because it would exclude this embodiment.

Finally, the conclusion that the multitude of threshold values *must* include both battery level and GPS signal level is crystalized by the fact that the '774 Patent only uses the phrase "threshold value" two times. One use of "threshold value" appears in column 13 in a description of Figure 4 where the specification notes "[i]n contrast to previous manufacturer tracking device power level settings, the present invention has the capability of power level (e.g., battery power level 406) adjustments includ[ing] multitude of threshold values." Ex. 1001, 13:58-62. Here,

the patentee is equating the battery power levels with the multitude of threshold values—a point that is not in dispute between the parties. The only other instance in which "threshold value" appears is in column 7, which was extensively discussed above: "accelerometer 130 activates upon one or more designated antenna(s) … detecting a first signal level, e.g., a low signal level or threshold value …." *Id.*, 7:55-58. In this instance, the patentee is clearly and indisputably equating a threshold value to a low GPS signal level. Thus, the only two instances in which "threshold values" are used include both battery level and GPS signal level. And as noted above, there is no basis in the plain language of claim 8, or in the law, to exclude the embodiment of "threshold values" that utilizes GPS signal levels.

Petitioner's reply brief set forth uncontroverted evidence that *Sakamoto* discloses a multitude of threshold values. Specifically, Petitioner submitted evidence showing *Sakamoto* "in fact teaches at least *four* distinct threshold values for changing the power level applied to the location tracking circuitry." Paper 25, 16. These four threshold values include "at least two battery level thresholds, and at least two GPS signal level thresholds." *Id.*, at 17; *see generally id.*, at 15-18. This is precisely what is contemplated by the embodiments of the '774 Patent, none of which are excluded by the express language of the claims. As such, *Sakamoto* teaches the "multitude of threshold values" and renders claim 8 of the '774 Patent invalid.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner

v.

LBT IP I LLC,
Patent Owner

Inter Partes Review Case No. IPR2020-01189
U.S. Patent No. 8,497,774

PETITIONER APPLE INC.'S REPLY REMAND BRIEF

I. Introduction

The specification of the ’774 Patent describes two different embodiments that rely on two different “threshold values.” LBT’s entire brief focuses on the battery level embodiment, which is described at columns 11-13 (and which includes Figure 4). Intentionally or otherwise, LBT completely ignores the GPS signal level embodiment described in columns 7-10. Ultimately, LBT’s argument does nothing to answer the Board’s question because the operation of the battery level embodiment is not in dispute between the parties. Instead, the dispute revolves around what to do with the GPS signal level embodiment disclosed in the portions of the specification that LBT ignores. The dispute is simply whether that embodiment is part of the claims or not. As discussed in the opening brief and below, the GPS signal level embodiment is absolutely part of the “multitude of threshold values” in claim 8. There is no limitation in the claims, or in the specification, that would compel a conclusion that excludes the GPS signal level embodiment. Moreover, LBT’s position runs the risk of violating fundamental legal principles of claim construction that may lead to further appellate issues. Because nothing in claim 8 limits its application to only the battery level embodiment, and because the language of claim 8 uses the broad and expansive “comprising” language, the Board must find that the “multitude of threshold values” includes both battery level and GPS signal level.

II. Argument

First, LBT's argument divorces GPS signal levels from the "power level that is monitored and adjusted by the battery power level monitor." *Id.* LBT advances the argument that "in context, the 'multitude of threshold values' can only be battery power level threshold values." *Id.*, 2-3. But this fundamentally ignores the operation of GPS receivers and the impact of a GPS signal level on the power level of the battery. Indeed, the inventors of the '774 Patent realized that GPS signal levels are intimately tied together with a high drain on the power level of the battery:

> GPS satellite communication signals may be obstructed or partially blocked, hindering tracking and monitoring capability. Not only is a GPS transceiver receiving a weak GPS signal [e.g., a weak GPS signal level], but also the GPS transceiver is depleting battery power in failed attempts to acquire communication signals…

'774 Patent, 3:2-8. Tellingly, LBT does not cite or discuss this portion of the specification in its brief.

Second, LBT ignores the express embodiment that correlates GPS signal levels with the threshold value. LBT instead focuses solely on the Fig. 4 battery level embodiment. LBT provides pages and pages of argument and citations that solely discuss the battery level embodiment. But this discussion is unhelpful because it ignores the fact that the '774 Patent discloses two embodiments that (allegedly) save power of the tracking device. The first is disclosed in column 7 where the inventors

note that the "designated [GPS] antennas, e.g., antennas 122a, 122b, detect[] **a first signal level, e.g., a low signal level or threshold value**."[1] '774 Patent, 7:55-59. Here, the inventors expressly and explicitly equate the GPS signal levels from the GPS antennas 122a/b with a "threshold value." This portion of the specification completely refutes LBT's arguments, which is likely why LBT ignored it. Because this embodiment was discussed extensively in Apple's opening brief[2] it will not be addressed further here except to note that it would be error to adopt a construction that reads out an embodiment of the specification. *See, e.g., Pacing Techs., LLC v. Garmin Int'l, Inc.,* 778 F.3d 1021, 1026 (Fed. Cir. 2015).

The third problem with LBT's argument is that it ignores the claim language itself. Limitation 8d reads as follows:

> wherein the battery power level monitor measures a power level of the charging unit and adjusts a power level applied to location tracking circuitry responsive one or more signal levels, *the power level* **comprising** *a multitude of threshold values* determined by a user or system administrator to intermittently activate or deactivate the location tracking circuitry to conserve power of the charging unit in response to the estimated charge level of the charging unit.

[1] As noted in Apple's opening brief, antennas 122a/b are the GPS antennas and, thus, can only be detecting a GPS signal level, not a battery level. Paper 43, Apple's Claim Construction Brief, 1, 3-4.
[2] Paper 43, Apple's Claim Construction Brief.

’774 Patent, Claim 8(d). As discussed above, and in Apple’s opening brief, there are two specific embodiments disclosed in the ’774 Patent for the threshold values—one for the GPS signal level and one for the battery level. Paper 43, 6-7 (noting that “threshold value” is only used twice in the ’774 Patent, once for battery power level and once for GPS signal level). It would be reversible error to exclude one of these embodiments unless the claim language expressly limits it to one of these embodiments. *Pacing Techs.* 778 F.3d at 1026. Nothing in the claim limits it to the battery level embodiment.

While LBT focuses its argument on the three words “the power level,” it ignores the term “comprising.” As the Board is well aware, “‘[c]omprising’ is a term of art used in claim language which means that the named elements are essential, but other elements may be added and still form a construct within the scope of the claim.” *Genentech, Inc. v. Chiron Corp.,* 112 F.3d 495, 501 (Fed.Cir.1997). Because of the term “comprising,” LBT invites error by suggesting “the ‘multitude of threshold values’ can only be battery power level threshold values” because this conclusion violates black letter law on claim construction. In essence, LBT’s argument would replace the phrase “comprising” with “consisting,” which is improper in the absence of any evidence overriding the presumption that exists with the use of the phrase “comprising.” *Crystal Semiconductor Corp. v. TriTech Microelectronics Intl’l, Inc.,* 246 F.3D 1336, 1362 (Fed. Cir. 2001) (“When a patent

claim uses the word "comprising" as its transitional phrase, the use of "comprising" creates a presumption that the body of the claim is open.") LBT has done nothing to show that this presumption should be overcome to otherwise limit or narrow the normal use of the phrase "comprising." Thus, the "multitude of threshold values" may include the power level of a battery ***but the claim is not limited to only those power levels given its use of the term "comprising***." Here, because the specification specifically describes GPS signal levels as another "threshold value," the use of the phrase "comprising" compels a conclusion that the "threshold values" in claim 8 are not limited to only battery levels.

Finally, the claim language itself dictates a conclusion that "threshold values" include both embodiments described in the specification. Limitation 8(d) discusses a "power level monitor" that measures the power of a battery (e.g., the charging unit). The device of claim 8 then adjusts the power level that is applied to the GPS (e.g., the "location tracking circuitry") in response to one or more signal levels. The claim then recites the power level includes, but is not limited to, a multitude of threshold values that are used to intermittently activate or deactivate the GPS circuitry to conserve power. Based on the broad, plain language used in claim 8, the claim is describing not only the battery level embodiment columns 11-13, as relied upon by LBT, but also the precise GPS signal embodiment from column 7 through column 10.

In the GPS signal embodiment, the "antennas 122a, 122b, detect[] a first signal level, e.g., a low signal level or threshold value." '774 Patent, 7:55-58. In that instance, the power level monitor would detect that threshold value (e.g., the low signal level). The '774 Patent states "electrical circuitry associated with GPS signal acquisition …. may be, for instance, placed on standby or in a sleep mode,"which is the "deactivat[ing] the location tracking circuity to conserve power" described in limitation 8(d). *Compare* '774 Patent, 7:60-62 with Claim 8. Another variant of this same embodiment is described at column 9 where "when GPS signaling is not practicable" (e.g., you have a threshold value that indicates a low GPS signal level), and "the transceiver circuitry (e.g., transceiver 102, location tracking circuitry 114, and signal processing circuitry 104) consumes reduced power for GPS circuitry while the electronic tracking device communicates displacement vectors" through use of the accelerometer. '774 Patent, 9:5-17. Again, the '774 Patent's disclosures match the claim language from claim 8(d) perfectly where it describes a power level that includes, but is not limited to, a scenario where GPS signal levels are low and GPS circuitry is deactivated to conserve power. And, in yet another variation of this embodiment, the '774 Patent describes "receiv[ing] communication signal of sufficient signal strength," e.g., a threshold value showing strong GPS signal levels, at which point "location tracking circuitry 114 are activated" while the accelerometer circuitry is deactivated (which will conserve battery power by turning

of unnecessary and duplicative hardware components). ’774 Patent, 10:58-67. This variation of the GPS signal level embodiment encompasses the portion of claim 8(d) that “intermittently activate[s] … the location tracking circuitry to conserve power.” *Id.*, Claim 8(d).

Because there is no language in the claim that would otherwise exclude, or read out, the GPS signal level embodiment, it would be error to exclude GPS signal levels from the threshold value. Thus, the Board should construe “multitude of threshold values” to include both GPS signal levels and battery levels.

Dated: September 20, 2023

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,

Petitioner

v.

LBT IP I LLC,

Patent Owner

Case IPR2020-01189
U.S. Patent No. 8,497,774

PATENT OWNER'S REPLY BRIEF

I. INTRODUCTION

As discussed in Patent Owner's Opening Brief, the language of Claim 8 from U.S. Patent No. 8,497,774 ("the '774 Patent") clearly shows that the term "a multitude of threshold values" is limited to battery power level threshold values and does not include GPS signal strength values. Specifically, Claim 8 recites:

> wherein the battery power level monitor measures ***a power level of the charging unit*** and adjusts ***a power level applied to location tracking circuitry*** responsive to one or more signal levels, ***the power level comprising a multitude of threshold values*** determined by a user or system administrator to intermittently activate or deactivate the location tracking circuitry to conserve power of the charging unit in response to the estimated charge level of the charging unit.

EX1001, 16:43-61 (emphasis added). That claim language shows that "the power level comprising a multitude of threshold values" refers back to the "power level of the charging unit" and the "power level applied to location tracking circuitry," and thus decides the question.

Petitioner's opening brief, however, ignores that clear claim language. Instead, it relies on a single embodiment disclosed in the '774 Patent that is separate and distinct from the embodiment covered by Claim 8's "multitude of threshold levels" and thus cannot support Petitioner's argument. *See* Paper 45, 1-6.

Even if the Board focused solely on the embodiments disclosed in the specification, the claimed "power level comprising a multitude of threshold values" is limited to battery power level values. The '774 Patent discloses two distinct and complimentary embodiments that are each separately encompassed in Claim 8. Petitioner correctly observed that the Federal Circuit has repeatedly admonished against a claim construction that would read out a specific embodiment disclosed in the specification by noting that "a claim construction excluding a preferred embodiment is rarely, if ever correct." *Sequoia Tech, LLC v. Dell, Inc.*, 66 F.4th 1317, 1327 (Fed. Cir. 2023) (*citing Kaufman v. Microsoft.*, 34 F.4th 1360, 1372 (Fed. Cir. 2022)). However, Petitioner's proposed construction would, in clear error, exclude the second embodiment. The proper construction of the term "a multitude of threshold values" recited in Claim 8 is limited to battery power level threshold values in accordance with the preferred embodiment shown in FIG. 4 and disclosed in the corresponding portion of the specification. *See* EX1001, 11:1-14:57.

II. ARGUMENT

As discussed above, the claim language alone shows that Claim 8's recitation of "the power level comprising a multitude of threshold values" refers back to "a power level of the charging unit" and "a power level applied to the location tracking circuitry" and is thus limited to battery power level threshold values. That conclusion is supported by the embodiments disclosed in the specification.

Petitioner mischaracterizes the first embodiment shown in FIG. 3 as "includ[ing] GPS ***signal level*** as part of the multitude of threshold values." Paper 45, at 1 (emphasis added). Yet, the quoted portion of the '774 Patent discloses only a single GPS signal level. EX1001, 7:55-59 ("detecting **a first** signal **level**, e.g., **a low** signal **level** or threshold **value**") (emphases added). Even when the single GPS signal level is referred to as a threshold value, it is a singular value.

More importantly, the embodiment of FIG. 3 upon which Petitioner relies relates to a different portion of the relevant limitation, specifically, "adjusts a power level applied to location tracking circuitry responsive to one or more signal levels." EX1001, 16:54-56. Of note, this portion was, as originally filed, recited in a distinct dependent claim (claim 16). EX2019, at 372.

While Petitioner notes that "[u]tilizing only battery levels as the multitude of threshold values simply would not work with the embodiment of Figure 3," Paper 45, at 5, "the power level comprising a multitude of threshold values" has nothing to do with the embodiment of FIG. 3. Instead, "the power level comprising a multitude of threshold values" corresponds to the embodiment of FIG. 4.

Petitioner further identifies the '774 Patent as "only us[ing] the phrase 'threshold value' two times." *Id.*, at 6. Petitioner continues "[o]ne use of 'threshold value' appears in column 13 in a description of Figure 4." *Id.* Of note, however, is that this distinct and complementary embodiment is the only disclosure that

explicitly uses the phrase "multitude of threshold values." EX1001, 13:58-62 ("the present invention has the capability of power level (e.g., battery power level 406) adjustments include multitude of threshold values.").

Petitioner's subsequent admission is both significant and dispositive – "[h]ere, the patentee is equating the battery power levels with the multitude of threshold values–a point that is not in dispute between the parties." Paper 45, at 6-7. Petitioner admits, and acknowledges no dispute, that the multitude of threshold values disclosed in conjunction with the embodiment of FIG. 4 only refer to battery power levels. Since "the power level comprising a multitude of threshold values" corresponds to the embodiment of FIG. 4, there is no dispute that a proper construction of "a multitude of threshold values" is limited to battery power level threshold values.

As Patent Owner stated in it's Opening Brief on Remand "[a]s originally filed, the 'multitude of threshold values' limitation was recited in former dependent claim 17." Paper 44, at 3 (citing EX2019, at 372). Patent Owner further stated "[a]s clearly disclosed, the recited 'multitude of threshold values' corresponds to value 419, which is explicitly disclosed as defining a battery power level threshold that can be adjusted to a multitude of values." *Id.*, at 4 (citing EX1001, FIG. 4; 11:44-63 and 13:58-67). To construe "multitude of threshold values" as suggested by Petitioner would erroneously read the preferred embodiment of FIG. 4 out of the claim.

To be clear, Petitioner attempts to improperly conflate the distinct embodiments of FIGs. 3 and 4 of the ’774 Patent to suggest that GPS signal levels, as disclosed in reference to FIG. 3, may somehow be included in the multitude of power level threshold values, as disclosed in reference to FIG. 4. That the ’774 Patent discloses a single GPS signal level threshold does not overcome the clear disclosure of two distinct types of threshold values (*i.e.*, a GPS signal level threshold value and a multitude of power level threshold values), the clear disclosure of two distinct embodiments (*i.e.*, FIGs. 3 and 4), and the recitation, as originally filed, of each embodiment in a distinct dependent claim (*i.e.*, original claim 16 corresponding to the embodiment of FIG. 3 and original claim 17 corresponding to the embodiment of FIG. 4). Patent Owner identified this attempt not only as improper, but also as new and untimely, in Patent Owner’s Sur-Reply as well as in Patent Owner’s Opening Brief on Remand. *See* Paper 31, at 13-14 and Paper 44, at 5.

As recited, “the battery power level monitor … adjusts a power level applied to location tracking circuitry responsive to one or more signal levels” encompasses the embodiment of FIG. 3, including any reference to a GPS signal level threshold. As separately recited, “the power level comprising a multitude of threshold values determined by a user or system administrator to intermittently activate or deactivate the location tracking circuitry…” distinctly encompasses the embodiment of FIG. 4, including any reference to battery power level threshold values. Petitioner agrees

that the embodiment of FIG. 4 "equat[es] the battery power levels with the multitude of threshold values." Paper 45, at 7. As such, the only proper construction, as agreed by Petitioner, is that the "threshold values" in the recited "a multitude of threshold values" are limited to battery power level threshold values

III. CONCLUSION

For the reasons set forth above, the proper construction of "multitude of threshold values" is such that the recited "threshold values" are limited to battery power level threshold values and claims 8, 10, 13, and 15 of the '774 Patent are not unpatentable.

Dated: September 20, 2023

Respectfully submitted,

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner

v.

LBT IP I LLC,
Patent Owner

Case No. IPR2020-01189

U.S. Patent No. 8,497,774

PETITIONER'S NOTICE OF APPEAL

Petitioner Apple Inc. ("Petitioner") hereby provides notice of its appeal to the United States Court of Appeals for the Federal Circuit from the Final Written Decision on Remand of the Patent Trial and Appeal Board entered on December 15, 2023, in IPR2020-01189 (Paper No. 48) ("Final Written Decision"), and from all underlying findings, determinations, rulings, opinions, orders, issues, and decisions regarding the *inter partes* review of U.S. Patent No. 8,497,774 (the "'774 Patent"). *See* 35 U.S.C. §§ 141, 142, and 319; 37 C.F.R. §§ 90.2–90.3; Federal Rule of Appellate Procedure 15, and Federal Circuit Rule 15. This Notice is timely under 37 C.F.R. § 90.3, having been filed no later than 63 days after the Final Written Decision.

In accordance with 37 C.F.R. § 90.2(a)(3)(ii), Petitioner states that the issues on appeal include, but are not limited to: the Board's determination that Petitioner had not demonstrated by a preponderance of the evidence that claims 8, 10, 13, and 15 of the '774 patent are unpatentable; the Board's determination that the claim term "the power level comprising a multitude of threshold values" excludes signal level threshold values; the Board's consideration of expert testimony, fact witness testimony, and other evidence in the record; and the Board's factual findings, conclusions of law, or other determinations supporting or related to the foregoing

issues, as well as all other issues decided adversely to Petitioner in any orders, decisions, rulings, or opinions.

This Notice of Appeal is being e-filed with the Clerk's Office for the United States Court of Appeals for the Federal Circuit, along with the payment of required docketing fees. In addition, a true and correct copy of this Notice of Appeal is being filed simultaneously with the Director of the United States Patent and Trademark Office.

DATED: February 15, 2024

Respectfully Submitted,

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CERTIFICATE OF FILING

The undersigned certifies that on February 15, 2024, in addition to being filed electronically through the Patent Trial and Appeal Board's E2E system, a true and correct copy of **PETITIONER'S NOTICE OF APPEAL** is being filed in paper via Priority Mail Express with the Director of the U.S. Patent and Trademark Office at the following address:

Mail Stop 8
Director of the U.S. Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

The undersigned also certifies that on February 15, 2024, a true and correct copy of **PETITIONER'S NOTICE OF APPEAL** is being filed via the electronic filing system, CM/ECF, with the Clerk's Office of the U.S. Court of Appeals for the Federal Circuit.

/s/ Adam P. Seitz
Adam P. Seitz

IRP2020-01189
U.S. Patent No. 8,497,774

CERTIFICATE OF SERVICE (37 C.F.R. § 42.6(e))

The undersigned certifies service pursuant to 37 C.F.R. § 42.6(e) that on February 15, 2024, a complete copy of **PETITIONER'S NOTICE OF APPEAL** was served electronically via e-mail on the following counsel of record for Patent Owner:

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DETAILED ACTION

Specification

1. Applicant is requested to update the status of U.S. Patent Application No. 11/969,905, filed on January 6, 2008 indicated in the instant application.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 8, 10, 13, 15, and 16 are rejected under 35 U.S.C. 102(e) as being anticipated by Huang et al. (US 7,826,968).

Regarding claim 8: Huang et al. disclose method, device and vehicle utilizing the same comprising a battery power monitor; a charging unit; and an electrical power resource management component to adjust cycle timing of at least one of a request rate of location coordinate packets to a target host and <u>a listen rate of the location coordinate packets responsive to an estimated charge level of the charging unit</u> (col. 5, lines 5-14).

Regarding claim 10: Huang et al. disclose a charge control management of the portable electronic tracking device that estimates charge capability and adjust cycling of the at least one

of a request rate of location coordinate packets to a host target and a listen rate of the location coordinate packets to maximize charge capability (col. 5, lines 7-9).

Regarding claim 13: Huang et al. disclose wherein the listen rate of the location coordinates comprises a global positioning system (GPS) system refresh rate of the location coordinates (col. 5, lines 5-7).

Regarding claims 15 and 16: Huang et al. disclose wherein the power charging monitor measures a power level of the power charging unit and substantially automatically adjusts power usage responsive to available power of the power charging unit to maximize power unit life and wherein the power charging monitor measures a power level of the power charging unit and adjusts a power level applied to the location tracking circuitry responsive to the signal level (col. 5, lines 9-14).

Allowable Subject Matter

4, Claims 1-7 and 18-21 are allowed.

5. Claims 9, 11, 12, 14, and 17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for allowance:

Regarding claim 1, patentability resides in "the updated set of network communication signaling protocols having a value that is responsive to a user input request; wherein the local battery power adjustment mechanism actives or deactivates at least one portion of the transceiver circuitry or the processor to conserve the battery charge level in response to the value", in combination with the other limitations of the claim.

Regarding claim 9, patentability resides in “wherein to electrical power resource management component comprises a substantially real-time user viewable display icon that indicates the estimate charge level and provides an on-line user adjustable cursor display that adjusts at least one of the request rate of the location coordinate packets to the target host and the listen rate of the location coordinate packets and gives substantially automatic updated estimated charge level of the charging unit”.

Regarding claim 11, patentability resides in “a cycle management apparatus to set up a timing schedule to maximize effectiveness of the request rate and listen rate responsive to measured velocity of the portable electronic tracking device”.

Regarding claim 14, patentability resides in “wherein the request rate and the listen rate are set remotely by a user using a mobile phone or wireless communication device”.

Regarding claim 17, patentability resides in “wherein the power level comprises a multitude of threshold value determined by a user or system administrator to intermittently activate or deactivate the location tracking circuitry to conserve power of the power charging unit in response to the estimated charge level of the power unit”.

Regarding claim 18, patentability resides in “”readjusting the initial timing schedule for communication of signaling parameters in accordance with a local request by a remote user using an Internet accessible icon that displays user viewable tradeoffs between the estimated charge unit life and charge unit update rate”, in combination with the other limitations of the claim.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phung T Nguyen whose telephone number is 571-272-2968. The examiner can normally be reached on 8:00am-4:30pm Mon thru. Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Daniel J. Wu can be reached on 571-272-2964. The fax numbers for the organization where this application or proceeding is assigned is 571-273-8300.

/Phung T Nguyen/

Primary Examiner, Art Unit 2612 Date: June 3, 2012

<u>AMENDMENTS TO THE SPECIFICATION</u>

Please amend the paragraph, beginning on page 1, line 5 of the original specification with the following paragraph.

Priority and Related Applications

This application is a continuation-in-part <u>of</u> and claims priority to <u>U.S. Patent number 8,102,256, originally filed as</u> U.S. patent application number 11/969,905 entitled "Apparatus and Method for Determining Location and Tracking Coordinates of a Tracking Device" that was filed on January 6, 2008[[,]]<u>;</u> and incorporates by reference in their entirety and claims priority to<u>:</u> U.S. patent application Serial No. 11/753,979 filed on May 25, 2007, entitled "Apparatus and Method for Providing Location Information on Individuals and Objects Using Tracking Devices"; U.S. patent application Serial No. 11/933,024 filed on October 31, 2007, entitled "Apparatus and Method for Manufacturing an Electronic Package"; US patent application Serial No. 11/784,400 filed on April 5, 2007, entitled "Communication System and Method Including Dual Mode Capability"; US patent application Serial No. 11/784,318 filed on April 5, 2007, entitled "Communication System and Method Including Communication Billing Options"; and <u>U.S. Patent number 8,244,468, originally filed as</u> US patent application Serial No. 11/935,901 filed on November 6, 2007, entitled "System and Method for Creating and Managing a Personalized Web Interface for Monitoring Location Information on Individuals and Objects Using Tracking Devices."

IN THE CLAIMS

Claims pending

- At time of the Action: Claims 1 – 21
- After this Response: Claims 1 – 15 and 18 – 21

Canceled claims: Claims 16-17

Amended claims: Claims 1-12, 15, 18 and 20

Claims Listing:

This listing of the claims will replace all prior versions and listings of claim in the present application.

1. (Currently Amended) A portable electronic tracking device to monitor location coordinates of one or more individuals and objects using a satellite navigation system, the portable electronic tracking device comprising:

a battery having a battery charge level;

transceiver circuitry;

processor circuitry;

a battery power monitor to measure in real-time the battery charge level and to make a prediction of an estimated remaining battery charge level in response to the battery charge level;

local battery power adjustment mechanism to generate in substantially real-time an updated set of network communication signaling protocols associated with at least one of a request rate of location coordinate packets to be communicated to a target host and a listen rate of the location coordinate packets from a satellite navigation system, the updated set of network communication signaling protocols having a value that is responsive to a user input request;

wherein the local battery power adjustment mechanism actives or deactivates at least one portion of the transceiver circuitry or the processor circuitry to conserve the battery charge level in response to the value.

2. (Currently Amended) The device of claim 1, wherein the local battery power adjustment mechanism comprises an adjustable screen icon to graphically display in substantially real-time a trade-off relationship between the remaining battery charge level and an update rate of the location coordinate packets that is in response to the updated set of network communication signaling protocols.

3. (Currently Amended) The device of claim 1, wherein the local battery power adjustment mechanism comprises a timing adjustment mechanism that adjusts the at least one of the request rate of the location coordinate packets to the target host and the listen rate of the location coordinates from a satellite navigation system in accordance with a current position of the tracking device.

4. (Currently Amended) The device of claim 1, wherein the local battery power adjustment mechanism comprises a user adjustable electronic display that indicates a current level of battery power and allows a user a capability to adjust power level thereof.

5. (Currently Amended) The device of claim 4, wherein the local battery power adjustment mechanism comprises an automatic sleep mode to set at least one of the request rate of the location coordinate packets to the target host and the listen rate of the location coordinates from the satellite navigation system to a minimal level until

the battery power monitor measures a sustainable battery charge level to process the at least one portion of an receive signal.

6. (Currently Amended) The device of claim 4, wherein the local battery power adjustment mechanism comprises a charge control management of the portable electronic tracking device that estimates charge capability and adjusts cycling of the at least one of a request rate of location coordinate packets to a target host and a listen rate of the location coordinate packets from the satellite navigation system to maximize charge capability.

7. (Currently Amended) The device of claim 1, wherein the local battery power adjustment mechanism comprises a cycle management apparatus to set up a timing schedule to maximize effectiveness of the request rate and the ~~response~~ listen rate in response to a substantially real-time measured velocity of the portable electronic tracking device.

8. (Currently Amended) A local charging management device to manage electrical resource capability for an electronic tracking device that is tracked by at least one other tracking device comprising:

a battery power level monitor;

a charging unit; and

an electrical power resource management component to adjust cycle timing of at least one of a request rate of location coordinate packets to a target host and a listen rate of the location coordinate packets responsive to an estimated charge level of the charging unit.

<u>wherein the battery power level monitor measures a power level of the charging unit and adjusts a power level applied to location tracking circuitry responsive to one or more signal levels, the power level comprising a multitude of threshold values determined by a user or system administrator to intermittently activate or deactivate the location tracking circuitry to conserve power of the charging unit in response to the estimated charge level of the charging unit</u>.

9. (Currently Amended) The apparatus of claim 8, wherein [[to]] <u>the</u> electrical power resource management component comprises a substantially real-time user viewable display icon that indicates the estimate<u>d</u> charge level and provides an on-line user adjustable cursor display that adjusts at least one of the request rate of the location coordinate packets to the target host and the listen rate of the location coordinate packets and gives substantially automatic updated estimated charge level of the charging unit.

10. (Currently Amended) The apparatus of claim 8, wherein the local <u>charging management</u> device comprises a charge control management of the portable electronic tracking device that estimates charge capability and adjust<u>s</u> cycling of the at least one of a request rate of location coordinate packets to a host target and a listen rate of the location coordinate packets to maximize charge capability.

11. (Currently Amended) The apparatus of claim 8, wherein the local <u>charging management</u> device comprises a cycle management apparatus to set up a timing schedule to maximize effectiveness of the request rate and listen rate responsive to measured velocity of the portable electronic tracking device.

12. (Currently Amended) The apparatus of claim 11, wherein the local charging management device electrically couples to a mobile phone to remote control the local apparatus to setup [[up]] a timing schedule from a multitude of wireless communication networks to communicate information between the electronic tracking device and the mobile phone.

13. (Original) The apparatus of claim 8, wherein the listen rate of the location coordinates comprises a global positioning system (GPS) system refresh rate of the location coordinates.

14. (Original) The apparatus of claim 8, wherein the request rate and the listen rate are set remotely by a user using a mobile phone or wireless communication device.

15. (Currently Amended) The apparatus of claim 8, wherein the battery power ~~charging~~ level monitor measures a power level of the ~~power~~ charging unit and substantially automatically adjusts power usage responsive to available power of the ~~power~~ charging unit to maximize power unit life.

16 - 17. (Canceled)

18. (Currently Amended) A method to control power usage comprising:

measuring charging unit power level of a tracking device communicated by a location coordinate tracking system;

adjusting charging unit power level of the tracking device in response to a substantially-real life estimate of [[the]] a unit power level of a charge unit of the tracking device;

creating an initial timing schedule for communication of signaling parameters associated with a target host request rate communicated with location coordinate information and listen rate of the location coordinate information, the initial time schedule being at least partially automatically and responsive to an estimated power level of the charge unit; and

readjusting the initial timing schedule for communication of signaling parameters in accordance with a local request by a remote user using an Internet accessible icon that displays user viewable tradeoffs between [[the]] an estimated charge unit life and a charge unit update rate.

19. (Original) The method of claim 18, wherein creating an initial timing schedule for communication of signaling parameters comprises creating a management schedule for setting a rate at which messages are exchanged between the tracking device and a target host.

20. (Currently Amended) The method of claim 18, wherein creating an initial timing schedule for communication of signaling parameters comprises creating a management schedule for setting a rate at which messages are exchanged between [[the]] a navigational satellite system and the tracking device to a local device to maximize effectiveness of the request rate and the listen rate to the location coordinate information in response to a measured velocity of the ~~portable electronic~~ tracking device.

21. (Original) The method of claim 18, wherein readjusting the timing schedule for communication of signaling parameters in accordance with a local request by a remote user comprise electrically coupling the tracking device to a mobile phone to remote control cycling the location coordinates to setup up a timing schedule between a multitude of wireless communication networks to communicate information between the electronic tracking device and the mobile phone.

REMARKS

Reconsideration and allowance of all pending claims in view of the foregoing amendments and the following remarks are respectfully requested.

Specification Objections

The specification is herein amended to correct informalities, specifically to conform the specification to the current status of U.S. Patent Applications indicated in the instant application. These revisions introduce no new matter.

Rejections under 35 U.S.C. §102(e)

Claims 8, 10, 13, 15, and 16 stand rejected under 35 U.S.C. §102(e) as being anticipated by Huang et al., (U.S. Patent Application No. 7,826,968; hereafter "Huang"). The Applicants respectfully traverse this rejection.

Nevertheless, without commenting on the propriety of the rejection and in the interest of expediting allowance of the application, the Applicants herein amend claims 8, 10 and 15 for clarification. Claim 16 is canceled herein.

Independent claim 8, as presently amended, recites (amendments underlined):

> wherein the battery power level monitor measures a power level of the charging unit and adjusts a power level applied to location tracking circuitry responsive to one or more signal levels, the power level comprising a multitude of threshold values determined by a user or system administrator to intermittently activate or deactivate the location tracking circuitry to conserve power of the charging unit in response to the estimated charge level of the charging unit.

Applicants respectfully submit that Huang fails to disclose at least these elements of claim 8, which were previously recited in canceled claims 16 and 17.

Applicants herein amend independent claim 8 to recite features previously recited in allowable dependent claim 17, including “the power level comprising a multitude of threshold values determined by a user or system administrator to intermittently activate or deactivate the location tracking circuitry to conserve power of the charging unit in response to the estimated charge level of the charging unit,” and in intervening claim 16. Applicants herein cancel claims 16 and 17 without prejudice.

Applicants respectfully submit that independent claim 8 is in allowable form and request the Examiner to withdraw the rejection of the claim.

Dependent claims 10, 13 and 15 are dependent from independent claim 8. Dependent claims 10, 13, and 15 are allowable by virtue of this dependency, as well as for additional features that each claim recites.

Allowable Subject Matter

A. Claims 1-7 and 18-21 are allowed by the Office. Applicants herein amend claims 1-7 and 18 to correct typographical errors, promote consistency in the language of the claims, and the like. No substantive amendments have been made to claims 1-7 and 18-21.

B. Claims 9, 11, 12, 14 and 17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claim (Office Action, page 3).

Applicants thank the Examiner for the allowable indication of these claims and appreciate the Examiner's assistance in advancing prosecution of the application.

Applicants herein amend independent claim 8 to recite features formerly recited in allowable dependent claim 17 and to recite features formerly recited in the intervening claim 16. The amendments to independent claim 8 are purely of form (i.e., dependent form to independent form), and are not to overcome prior art or any other objections. Accordingly, dependent claims 16 and 17 are herein cancelled without prejudice.

Applicants respectfully submit that independent claim 8 is in allowable form. Therefore, Applicants submit that claims 9, 11, 12, and 14 are in condition for allowance.

Conclusion

All objections and rejections having been addressed, it is respectfully submitted that the present application is now in condition for allowance, and early and forthright issuance of a Notice to that effect is earnestly solicited.

If any issues remain that would prevent allowance of this application, Applicants request that the Examiner contact the undersigned representative before issuing a subsequent Action.

Respectfully Submitted,

Dated: September 10, 2012

By: /Patrick D. S. Reed/
Patrick D. S. Reed
Reg. No. 61,227

UNITED STATES PATENT AND TRADEMARK OFFICE

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NOTICE OF ALLOWANCE AND FEE(S) DUE

93892 7590 09/20/2012
Timberline Patent Law Group
108 N. Washington St.
Suite 417
Spokane, WA 99201

EXAMINER	
NGUYEN, PHUNG	
ART UNIT	PAPER NUMBER
2612	

DATE MAILED: 09/20/2012

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/419,451	04/07/2009	Joseph F. Scalisi	LB1-006USC1	1643

TITLE OF INVENTION: APPARATUS AND METHOD FOR ADJUSTING REFRESH RATE OF LOCATION COORDINATES OF A TRACKING DEVICE

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	$870	$300	$0	$1170	12/20/2012

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

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B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

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Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
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Alexandria, Virginia 22313-1450
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INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

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93892 7590 09/20/2012

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Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/419,451	04/07/2009	Joseph F. Scalisi	LB1-006USC1	1643

TITLE OF INVENTION: APPARATUS AND METHOD FOR ADJUSTING REFRESH RATE OF LOCATION COORDINATES OF A TRACKING DEVICE

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	$870	$300	$0	$1170	12/20/2012

EXAMINER	ART UNIT	CLASS-SUBCLASS
NGUYEN, PHUNG	2612	340-539130

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
   - ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
   - ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
   (1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
   (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
   1________________
   2________________
   3________________

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies ____________

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number ________ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ❑ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.
- ❑ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature ________________ Date ________________

Typed or printed name ________________ Registration No. ________________

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
NGUYEN, PHUNG	
ART UNIT	PAPER NUMBER
2612	

DATE MAILED: 09/20/2012

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 730 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 730 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 12/419,451	Applicant(s) SCALISI ET AL.	
	Examiner PHUNG NGUYEN	Art Unit 2612	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *09/10/12*.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1-15,18-21 (renumbered as 1-19)*.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE “MAILING DATE” of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER’S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☐ CORRECTED DRAWINGS (as “replacement sheets”) must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson’s Patent Drawing Review (PTO-948) attached
   1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner’s Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner’s comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☐ Examiner's Amendment/Comment
8. ☐ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

/PHUNG NGUYEN/
Primary Examiner, Art Unit 2612

WHAT IS CLAIMED IS:

1. A portable electronic tracking device to monitor location coordinates of one or more individuals and objects using a satellite navigation system, the portable electronic tracking device comprising:

a battery having a battery charge level;

transceiver circuitry;

processor circuitry;

a battery power monitor to measure in real-time the battery charge level and to make a prediction of an estimated remaining battery charge level in response to the battery charge level;

local battery power adjustment mechanism to generate in substantially real-time an updated set of network communication signaling protocols associated with at least one of a request rate of location coordinate packets to be communicated to a target host and a listen rate of the location coordinate packets from a satellite navigation system, the updated set of network communication signaling protocols having a value that is responsive to a user input request;

wherein the local battery power adjustment mechanism actives or deactivates at least one portion of the transceiver circuitry or the processor to conserve the battery charge level in response to the value.

2. The device of claim 1, wherein the local battery adjustment mechanism comprises an adjustable screen icon to graphically display in substantially real-time a trade-off relationship between the remaining battery charge level and an update rate of the location coordinate packets that is response to the updated set of network communication signaling protocols.

3. The device of claim 1, wherein the local battery adjustment mechanism comprises a timing adjustment mechanism that adjust the at least one of the request rate of the location coordinate packets to the target host and the listen rate of the location coordinates from a satellite navigation system in accordance with a current position of the

tracking device.

4. The device of claim 1, wherein the local battery adjustment mechanism comprises a user adjustable electronic display that indicates a current level of battery power and allows a user a capability to adjust power level thereof.

5. The device of claim 4, wherein the local battery adjustment mechanism comprises an automatic sleep mode to set at least one of the request rate of the location coordinate packets to the target host and the listen rate of the location coordinates from the satellite navigation system to a minimal level until the battery power monitor measures a sustainable battery charge level to process the at least one portion of an receive signal.

6. The device of claim 4, wherein the local battery adjustment mechanism comprises a charge control management of the portable electronic tracking device that estimates charge capability and adjust cycling of the at least one of a request rate of location coordinate packets to a target host and a listen rate of the location coordinate packets from the satellite navigation system to maximize charge capability.

7. The device of claim 1, wherein the local battery adjustment mechanism comprises a cycle management apparatus to set up a timing schedule to maximize effectiveness of the request rate and the response rate in response to substantially real-time measured velocity of the portable electronic tracking device.

8. A local charging management device to manage electrical resource capability for an electronic tracking device that is tracked by at least one other tracking device comprising:

a battery power monitor;

a charging unit; and

an electrical power resource management component to adjust cycle timing of at least one of a request rate of location coordinate packets to a target host and a listen rate of the location coordinate packets responsive to an estimated charge level of the charging unit.

9. The apparatus of claim 8, wherein to electrical power resource management component comprises a substantially real-time user viewable display icon that indicates the estimate charge level and provides an on-line user adjustable cursor display that adjusts at least one of the request rate of the location coordinate packets to the target host and the listen rate of the location coordinate packets and gives substantially automatic updated estimated charge level of the charging unit.

10. The apparatus of claim 8, wherein the local device comprises a charge control management of the portable electronic tracking device that estimates charge capability and adjust cycling of the at least one of a request rate of location coordinate packets to a host target and a listen rate of the location coordinate packets to maximize charge capability.

11. The apparatus of claim 8, wherein the local device comprises a cycle management apparatus to set up a timing schedule to maximize effectiveness of the request rate and listen rate responsive to measured velocity of the portable electronic tracking device.

12. The apparatus of claim 11, wherein the local device electrically couples to a mobile phone to remote control the local apparatus to setup up a timing schedule from a multitude of wireless communication networks to communicate information between the electronic tracking device and the mobile phone.

13. The apparatus of claim 8, wherein the listen rate of the location coordinates comprises a global positioning system (GPS) system refresh rate of the location coordinates.

14. The apparatus of claim 8, wherein the request rate and the listen rate are set remotely by a user using a mobile phone or wireless communication device.

15. The apparatus of claim 8, wherein the power charging monitor measures a power level of the power charging unit and substantially automatically adjusts power usage responsive to available power of the power charging unit to maximize power unit life.

16. The apparatus of claim 8, wherein the power charging monitor measures a power level of the power charging unit and adjusts a power level applied to the location tracking circuitry responsive to the signal level.

17. The apparatus of claim 16, wherein the power level comprises a multitude of threshold value determined by a user or system administrator to intermittently activate or deactivate the location tracking circuitry to conserve power of the power charging unit in response to the estimated charge level of the power unit.

18. A method to control power usage comprising:

measuring charging unit power level of a tracking device communicated by a location coordinate tracking system;

adjusting charging unit power level of the tracking device in response to a substantially-real life estimate of the unit power level of a charge unit of the tracking device;

creating an initial timing schedule for communication of signaling parameters associated with a target host request rate communicated with location coordinate information and listen rate of the location coordinate information, the initial time schedule being at least partially automatically and responsive to an estimated power level of the charge unit; and

readjusting the initial timing schedule for communication of signaling parameters in accordance with a local request by a remote user using an Internet accessible icon that displays user viewable tradeoffs between the estimated charge unit life and charge unit update rate.

19. The method of claim 18, wherein creating an initial timing schedule for communication of signaling parameters comprises creating a management schedule for

setting a rate at which messages are exchanged between the tracking device and a target host.

20. The method of claim 18, wherein creating an initial timing schedule for communication of signaling parameters comprises creating a management schedule for setting a rate at which messages are exchanged between the navigational satellite system and the tracking device to local device to maximize effectiveness of the request rate and the listen rate to the location coordinate information in response to measured velocity of the portable electronic tracking device.

21. The method of claim 18, wherein readjusting the timing schedule for communication of signaling parameters in accordance with a local request by a remote user comprise electrically coupling the tracking device to a mobile phone to remote control cycling the location coordinates to setup up a timing schedule between a multitude of wireless communication networks to communicate information between the electronic tracking device and the mobile phone.

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